The World Organisation for Animal Health (OIE)

Prevention and control of animal diseases worldwide

Economic analysis –
Prevention versus outbreak costs

Final Report
Part I

Submitted by:
Civic Consulting - Agra CEAS Consulting

Part I prepared by Agra CEAS Consulting

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September 2007

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List of acronyms

ACIAR:	Australian Centre for International Agricultural Research
ADB:	Asian Development Bank
AH:	Animal Health
AHI:	Avian and Human Pandemic Influenza
AHIF:	Avian and Human Influenza Facility
AI:	Avian Influenza
ALIVE:	ALive Platform, Partnership for Livestock Development, Poverty Alleviation & Sustainable Growth in Africa
ANSVA:	National Sanitary Veterinary and Food Safety Authority (Romania)
APL:	Adaptable Program Loan
ASEAN:	Association of Southeast Asian Nations
ASF:	African Swine Fever
AUIBAR:	African Union Inter-African Bureau of Animal Resources
AusAID:	Australian Government's overseas aid program
AUSVETPLAN:	Australian Veterinary plan
BIPs:	Border Inspection Posts
BSE:	Bovine Spongiform Encephalopathy
CAECC:	Central Anti-Epizootic Command Centre (Romania)
CBA:	Cost-Benefit Analysis
CBPP:	Contagious Bovine Pleuropneumonia
COHEFA:	Hemispheric Committee for the Eradication of Foot-and-Mouth Disease
CS:	Current Situation
CSF:	Classical Swine Fever
DALYs:	Disability Adjusted Life Years
DEFRA:	Department for Environment, Food and Rural Affairs (UK)
EC:	European Commission
ECTAD:	Emergency Centre for Transboundary Animal Disease Operations
EFSA:	European Food Safety Authority
EIU:	Economist Intelligence Unit
EMPRES:	(FAO) Emergency Prevention System
EU MS:	European Union Member States
EU:	European Union
EUR:	Euro (currency)
FAO:	Food and Agriculture Organisation of the United Nations
FAOSTAT:	Statistical Databases from the Food and Agriculture Organization
FDL&PCS:	Nigeria Federal Department of Livestock and Pest Control Services
FMD:	Foot-and-Mouth disease
FVO:	European Commission Food and Veterinary Office
GDLN:	Global Development Learning Network
GDP:	Gross Domestic Product
GEIFA:	Inter-American group for FMD eradication
GF-TADs:	(OIE/FAO) Global Framework for Transboundary Animal Diseases
GLEWS:	(FAO/OIE/WHO) Global Early Warning System
GPAI:	Global Program for Avian Influenza Control and Human Pandemic Preparedness and Response
GREP:	Global Plan for the Eradication of Rinderpest

H5N1	Haemagglutinin type 5; Neuraminidase subtype 1 (Influenza Virus)
HCMC:	Ho Chi Min City
HDI:	Human Development Index
HPAI:	Highly Pathogenic Avian Influenza
IAEA:	International Atomic Energy Agency
IDAH:	Institute for Diagnosis and Animal Health (Romania)
IFPRI:	International Food Policy Research Institute
IMF:	International Monetary Fund
IS:	Improved Situation
IVHPH:	Institute for Veterinary Hygiene and Public Health (Romania)
LDCs:	Least Developed Countries
MAFRD:	Ministry of Agriculture, Forestry and Rural Development
MAP:	Multi-country Adaptable Program Loan
MARD:	Ministry of Agriculture and Rural Development
MDGs:	Millennium Development Goals
MTM:	Malaysia-Thailand-Myanmar
N:	Nigerian Naria (currency)
NADIS:	National Animal Disease Surveillance System (Nigeria)
NEEDs:	National Economic Empowerment and Development Strategy
NLPD:	National Livestock Project Division
NPV:	Net Present Value
NRL:	National Reference Laboratory
NSCAI:	National Steering Committee for the Prevention and Control of Avian Influenza (Vietnam)
NVRI:	National Veterinary Research Institute (Nigeria)
OAS:	Organization of American States
OAU:	Organisation of African Unity
OECD:	Organisation for Economic Co-operation and Development
OFFLU:	OIE/FAO Network on Avian Influenza
OIE:	World Organisation for Animal Health
OPI:	Integrated Operational Program for Avian and Human Influenza
PACE:	Pan African Programme for the Control of Epizootics
PAHO:	Pan American Health Organisation
PAN:	Nigerian Poultry Association
PANAFTOSA:	Pan American Foot-and-Mouth Disease Centre
PARC:	Pan African Rinderpest Campaign
PCR:	Polymerase Chain Reaction
PHEFA:	Hemispheric Program for FMD eradication
PPLPI:	Pro-Poor Livestock Policy Initiatives
PPR:	Peste de Petits Ruminants
PVS:	(OIE) Performance, Vision and Strategy: A Tool for Veterinary Services
RCU:	Regional Coordination Unit for FMD in South-East Asia
RON:	Romanian currency
SANCO:	European Commission Health and Consumer Protection
SARS:	Severe Acute Respiratory Syndrome
SE Asia:	South East Asia
SEAFMD:	Sub-commission for FMD control in South-East Asia
SENASA:	National service of livestock, plant health and food security (Argentina)

SOPs:	Standard Operating Procedures
SPS:	Sanitary and Phytosanitary
STDF:	Standards and Trade Development Facility of the WTO
STM:	(FAO/OECD) Short Term commodity Model
TADs:	Transboundary Animal Diseases
TCP:	FAO Technical Cooperation Programme
TRYM:	Treasury macro econometric model
UK:	United Kingdom
UN:	United Nations
UNDP:	United Nations Development Programme
UNSIC:	United Nations System Influenza Co-ordinator
URAA:	Uruguay Round Agreement on Agriculture
US:	United States of America
USD:	United States Dollar (currency)
USDA	United States Department of Agriculture
VLUs:	Veterinary Livestock Units
VND:	Vietnam currency
VS:	Veterinary Services
VSF:	Vétérinaires Sans Frontières
VTHs:	Veterinary Teaching Hospitals (Nigeria)
WAHID:	(OIE) World Animal Health Information Database
WANSCA:	West African Network for the promotion of Short Cycle Animals in rural areas
WB:	World Bank
WHO:	World Health Organization
WTO:	World Trade Organisation
YLDs:	Years of life lived with disability
YLLs:	Years of life lost

Acknowledgements

This analysis would not have been possible without the support of a number of organisations and information sources, including the World Organisation for Animal Health (OIE), the Food and Agriculture Organization (FAO), AU-IBAR, the UNDP, and competent national authorities in the case study countries. We also would like to thank organisations, such as *Agronomes et Vétérinaires Sans Frontières*, the European Commission (EC), the French National Institute of Agriculture Research (INRA), the Organisation for Economic Co-operation and Development (OECD) and the World Bank, which have authorized several of their experts to review the draft reports in depth. We would like to express our gratitude to these experts that provided very helpful written comments.[1] We also would like to thank Alain Dehove of the OIE and François Le Gall of the World Bank for the support and guidance provided throughout the study.

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[1] Participants in the peer-review process were asked to provide their expert opinion, without necessarily expressing the view of their organisation.

Executive Summary

Timing and methodology used

This study was conducted by Agra CEAS Consulting Ltd in the period November 2006 to March 2007 with some further updating in September 2007. The work was undertaken using desk research, literature review and construction of a detailed and extensive literature database. It also involved consultations with key relevant institutions/authorities and experts and case studies in 4 countries: Argentina, Vietnam, Nigeria and Romania. Finally a model to provide detailed estimates of the costs of outbreaks (by types of direct and indirect impact) with application to the particular case of HPAI was developed. This enabled the comparison of prevention versus outbreaks costs, so as to derive conclusions on the relative costs and benefits of improving the prevention and control systems in the animal health field.

Study focus

The focus of this project has been on Transboundary Animal Diseases (TADs), particularly those with high zoonotic potential. Transboundary animal diseases, in the context of this project, are defined as those that are of significant economic, trade and/or food security importance for a considerable number of countries, which can easily spread to other countries and reach epidemic proportions and where control/management, including exclusion, requires co-operation between several countries. The occurrence of such diseases and their control and eradication poses significant challenges for the world's Veterinary Services (VS) and entails substantial socio-economic costs, especially in the context of developing countries' poverty alleviation and development objectives. In addition, many of these diseases have high public health relevance and have become virtually endemic in many parts of the developing world. Due to both its high public health relevance and its significant socio-economic implications, the particular focus of this work has been on Highly Pathogenic Avian Influenza (HPAI). Foot and Mouth Disease (FMD) which has had extensive socio-economic impacts wherever it has occurred and has attracted significant control and eradication efforts and resources is also particularly addressed. The study covers the 132 developing country members of the OIE.

The definition of prevention and control costs, outbreak costs and what would be the benefits of improved prevention and control systems is based on a review of literature, taking the examples of prevention and control strategies currently in place (in particular for HPAI and FMD). The costs of prevention and control include emergency preparedness, human resources, surveillance systems and vaccination. Disease outbreak costs are broken down into direct cost and losses in the form of direct production costs of various kinds as well as control costs and indirect impacts in terms of ripple and spill-over effects as well as impacts on wider society. The review and assessment of the various costs involved in prevention and in the event of disease outbreak are outlined in detail by type of costs.

Conclusions and model results

The review of the literature indicates clearly that when a comparison of prevention versus outbreak costs is made, the majority of the reviewed studies conclude that the significant benefits that accrue from improved prevention and control measures outweigh the cost of investment. Thus, for example, in Latin America investment in improvements to animal health of some additional US$ 157 million per year over

15 years generates a Net Present Value of US$ 1.9 billion. In Africa it has been estimated that an investment of Euro 14.7 to control CBPP could save Euro 30 million in losses from morbidity/mortality, leading to a net benefit of Euro 15.4 million and in Asia eradication programmes for FMD have been assessed to provide benefits in terms of improved trade and market access that are worth several times the investment. While specific results need to be treated with caution and clearly depend on what underlying assumptions are made and the methodological tools used (it is noted that the analysis which can be defined as a full classical cost benefit analysis is relatively limited in this field), the nature of the relationship between outbreak costs compared to the costs of prevention is indisputable and is validated by the four case studies on this issue which were undertaken for Argentina, Vietnam, Nigeria and Romania.

Drawing on this analysis the report provides a global overview of prevention costs versus outbreak costs for HPAI using a specific analytical tool incorporating a baseline, scenarios and assumptions on key parameters from which to estimate the detailed direct and indirect costs of a disease outbreak.

At a country level the “most likely”, “low impact” and “high impact” scenarios vary in terms of the duration of the impact of the epidemic and the intensity of disease spread within countries. At a global level the three scenarios used are formulated on the basis of the geographical coverage of the disease worldwide, with scenario A including only H5N1 infected countries, scenario B infected and ‘non infected at immediate risk’ countries, and scenario C all developing/transition countries that are members of the OIE.

The range of outcomes in relation to **direct costs and losses** under the different scenarios are as follows:

The results for scenarios A and B tend to be very similar, reflecting the relatively small number of countries added under scenario B, given the current state of HPAI outbreaks worldwide. If this position changes, with a more substantial geographical spread of the disease, then the impact would start moving closer to the substantially higher figures of scenario C. Thus, total direct costs and losses (excluding consequential on-farm losses) in scenarios A and B are estimated at US$ 5.3 billion and US$ 6.1 billion respectively (on an annual basis), but would rise up to US$ 9.7 billion if the disease were to spread throughout the developing world. Including consequential on-farm losses, the total direct impact would be US$ 11.7 billion and US$ 13.5 billion respectively in the case of scenarios A and B, but could rise up to US$ 21.3 billion if the disease was to spread more worldwide along the lines suggested by scenario C. It is noted that in all cases, the impact is not proportionate to the number of countries added under each scenario, because the countries of scenarios A and B account for 55% and 63% respectively of the poultry stock of all developing OIE country members.

The various **indirect costs** in the event of an HPAI outbreak have been estimated as a range between 3 possible outcomes from the 3 main scenarios (‘most likely’, ‘low impact’ and ‘high impact’). Global estimates of the indirect impact under the ‘most likely scenario’ are presented on an annual basis and in total terms (i.e. depending on the duration of the impact of the epidemic). Under the ‘most likely’ scenario, ripple costs are estimated at US$ 5.3 billion in terms of domestic market losses in the poultry sector and a further US$ 3.8 billion in terms of export market losses on an annual basis. Assuming a 2 year duration of impact, as is currently the case under the ‘most likely’ scenario based on real market baseline trends, the total ripple impact in terms of domestic and export market losses in the poultry sector would be double the above amounts (i.e. to US$ 10.6 billion and US$ 7.5 billion respectively).

The considerable extent to which the relative value of spill-over (tourism) and wider society (human pandemic) costs outweigh the ripple effects is also highlighted. In the case of spill-over effects in the tourism sector alone, these are estimated to amount to US$ 72 billion on an annual basis under the ‘most likely' scenario and double that amount assuming a 2-year duration of the impact (i.e. US$ 144 billion). Wider society costs, in the event of a human pandemic, are several multiples of all costs, and depending on the severity of the outbreak these are estimated at US$ 311.2 billion (at 15% attack rate), and at US$ 711.2 billion (at a 35% attack rate) on an annual basis alone. It should be noted that these costs exclude certain types of indirect impacts for which it has not been possible to provide estimates on a global scale. Such impacts include ripple effects on upstream/downstream industries (raw material suppliers, catering and distribution, wholesale markets, employment in the sector etc.), spill-over effects (e.g. on the services industry) and other wider society costs (e.g. environmental effects).

In conclusion it is important to note that the aim here has been to develop a flexible tool, rather than solely providing estimates as such. This means that the baseline, the assumptions and the scenarios can be improved/refined at any point in time, as further research and evidence on a disease impact becomes available. This tool allows a flexible approach, which highlights the relative importance of the various direct and indirect impacts, so as to provide direction to policy-making in this field.

It should also be noted that in this study this tool has been developed specifically for the case of HPAI, but it has the potential to be adapted for application in the case of other TADs such as FMD.

The report in brief

Timing and methodology used

The work on Part I of this project was conducted by Agra CEAS Consulting Ltd in the period November 2006 to March 2007 with some further updating in September 2007. The work was undertaken using desk research, a literature review and construction of a detailed and extensive literature database. It also involved consultations with key relevant institutions/authorities and experts and case studies in 4 countries: Argentina, Vietnam, Nigeria and Romania. Finally a modelling tool to provide detailed estimates of the costs of outbreaks (by types of direct and indirect impact) with application to the particular case of HPAI was developed. This enabled the comparison of prevention versus outbreaks costs, so as to derive conclusions on the relative costs and benefits of improving the prevention and control systems in the animal health field.

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Analysis steps

Classification and definitions

The study starts with a classification of the countries (by GDP, trade status) and the nature of the farming systems in place (commercial, back yard), to highlight the importance of these factors in defining the appropriate prevention and control strategies and in establishing the impact of animal diseases.

A review of the current prevention and control strategies in place, in particular for HPAI and FMD, provides the basis for the definition of prevention and control costs, outbreak costs and what would be the benefits of improved prevention and control systems.

For the purposes of the analysis, **prevention and control costs** have been defined as the costs incurred by governments during 'normal' times, i.e. in advance of outbreaks. In particular, these include:

- Emergency preparedness, in terms in particular of the existence of emergency preparedness plans and the state of VS more generally,
- Surveillance networks, in terms in particular of diagnostic capacity and border controls.

For the definition of **outbreak costs** a differentiation was made between direct costs and losses, and the various indirect costs and indirect losses as follows:

A. Direct impact

The total direct cost of a disease is the sum of the production losses (direct and consequential) and the costs of disease control, as follows:

- **Direct losses:** These stem either from the disease itself, or from sanitary control measures (stamping-out policies). In addition to the loss from the value of animals culled as such, there are culling and disposal costs.
- **Control costs: S**uch costs during and after the outbreak typically include equipment, facilities, disinfectants, protective clothing, staff in quarantine stations etc. They may also include (ring) vaccination where this is considered appropriate and is available.
- **Other direct production losses**: Consequential on-farm losses include losses due to the fall in stock, to restrictions of movement when zoning restrictions are put in place, and due to the loss in animal value.

B. Indirect impact

The indirect impact of livestock diseases includes ripple effects, spill-over effects and costs to the wider society including longer term macro-economic effects. These costs are defined as follows:

- **Ripple effects:** Ripple effects include impacts on livestock and livestock product prices and on upstream and downstream activities along the livestock value chain upstream and the producer: breeding, feed production, input supply, production, collection and trade (of eggs or live birds), slaughter, processing, final sale and consumption.
- **Spill-over effects:** Apart from agriculture as such and the impact of diseases along the affected livestock sector's value chain, tourism and services are the two other sectors most likely to be severely affected. The macro-economic impact can consequently be severe if these two sectors are important in the economy. In addition, as already indicated, animal diseases can have major effects on food availability and quality for poor communities and therefore raise issues of food security, as well as having negative effects on poverty alleviation.
- **Wider society:** Developing or transition countries, which tend to have inadequate/inefficient public health systems, are particularly exposed to the risk of zoonoses on public health. In the particular case of a pandemic, a large proportion of the economic losses are caused by higher morbidity and mortality rates in the human population and by its repercussions on the world economy.

On the other hand, three main **benefits** of improved prevention are most widely explored in the available literature. These are as follows:

1. **Enhanced food security / poverty alleviation.** This includes the benefits accrued from productivity improvements and generally improved production systems.
2. **Improved market access**
3. **Savings in potential outbreak costs**

In terms of the first objective, it is important to note that an estimated 600 million poor people worldwide rely directly on livestock production for their livelihoods. Several parts of the developing world, most notably sub-Saharan Africa, are still below the recommended protein diet levels and only get a fraction of the daily livestock protein intake of industrialised countries. In addition, each year the population of developing countries grows by an estimated 72 million, with the highest growth rates in Africa and in Asia, adding to the demand for food products. Average annual per capita consumption of all meats in the developed world is thus projected to increase to 30 kg, which represents an increase by about a third on 1993 levels. Improved animal health not only guarantees food supplies but is also considered to be a major factor for productivity gains in the livestock sector.

In terms of the second objective, trade in livestock and livestock products makes up approximately one sixth of global agricultural trade. Most of these exports (nearly 80%) currently come from the developed world. For example, the least developed countries are estimated to account for only less than 5% of total world meat exports by value. Within this overall picture only a few countries account for the bulk of exports: 90 % of exports of beef and poultry (70% for pork) come from 5 countries. This having been said, it is widely acknowledged in the available literature that big gains are possible for the developing countries from the removal of sanitary barriers now that post URAA tariff barriers have been reduced and that these opportunities are likely to expand if tariff barriers are further reduced in the ongoing WTO and bilateral negotiations. Within this evolving policy outlook, the improvement in SPS conditions for developing country exporters or potential exporters has become an issue of utmost importance (as well as being an obligation under the WTO SPS Agreement).

Literature review

This definitional work was followed by an extensive review of the literature on the costs of prevention and control including emergency preparedness, human resources, surveillance systems and vaccination. In this context the study comes to the following conclusions on the relevance of country preparedness to prevention and control costs:

- The costs of improved prevention and control for the major TADs will depend *inter alia* on the current level of preparedness in the various countries;

- Existing data from international surveys (OIE, UNSIC) and other literature suggest that there are considerable differences in approach and status quo between developing/transition countries, notably in terms of the overall state of Veterinary Services, preparation of prevention and control plans for specific diseases (e.g. HPAI), available and well-trained veterinary staff, epidemio-surveillance networks, border controls, diagnostic capacity, and vaccination;

- In the context of countries' international obligations within the overall framework for the prevention and control of major TADs, as defined by the OIE, the varying levels of preparedness and prevention systems between countries indicate the need to define priorities and assess gaps on a country by country basis. In the case of vaccination the policy debate on the appropriateness and conditions for application of this method is currently on-going;

- This has implications in terms of the budget required in each country to enable it to arrive to an optimal surveillance system.

The literature review also indicates clearly that when a comparison of prevention versus outbreak costs is made, and it must be said that there is relatively little analysis which can be defined as a full classical cost benefit analysis, the majority of the studies reviewed studies conclude that the significant benefits that accrue from improved prevention and control measures outweigh the cost of investment. Thus for example, in Latin America investment in improvements to animal health of some additional US$ 157 million per year over 15 years generates a Net Present Value of US$ 1.9 billion. In Africa it has been estimated that an investment of Euro 14.7 to control CBPP could save Euro 30 million in losses from morbidity/mortality, leading to a net benefit of Euro 15.4 million and in Asia eradication programmes for FMD have been assessed to provide benefits in terms of improved trade and market access that are worth several times the investment. While specific results need to be treated with caution and clearly depend on what underlying assumptions are used the nature of the relationship between outbreak costs compared to the costs of prevention is indisputable and is validated by the four case studies which were undertaken.

Case study results[2]

Argentina:

The FMD campaign undertaken in South America during 1999-2004 has demonstrated the value of regional action when the control of TADs of major economic importance to the region is being sought. It also demonstrates the significance of maintaining the investment when pockets of resistance remain which risk to erupt to full blown outbreaks in countries of the region. Some US$ 3.5 billion have been committed on the fight against FMD by South American countries during 1990-2004, which is considered to have contributed to an effective control of the disease during this period. Against this, in the space of only a year, the 2000/01 FMD outbreak in Argentina has resulted to losses in beef export revenue alone of US$ 439 million.

Preliminary results of on-going cost-benefit analysis of improvements in Argentina's and wider Latin American VS (OIE Regional Representation/CEMA) suggest that there are significant benefits in terms of both productivity gains and potential trade gains from investing in such improvements, and that the final outcome in terms of NPV and welfare gains justifies the investment. For example, increased expenditure of some US$ 18 million in Argentina's VS would result in productivity gains of US$ 20 million per year, and additional annual exports of 260.000 tonnes.

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[2] *The benefits highlighted in the case studies assume that a certain investment will result in productivity gains and exports. The scale of the benefit is conditional on the effective design and implementation of the investment to be undertaken, leading to an effective control of the disease (eradication is questionable as there is a significant risk factor that the disease would re-appear, as has been the general experience. The above calculations do not take into account the incremental operational costs involved, which can be a significant part of the cost of strengthening VS. On the other hand, the investment in strengthening the control of a particular disease, e.g. HPAI, can have important spill-over benefits on the entire VS.*

Vietnam:

The country suffers from a number of high risk factors with respect to HPAI. Consequently the government has committed significant national resources (including donor support) to the fight against avian influenza and for the prevention of a human pandemic. This has included extensive restructuring in the VS since the 2004-05 AI outbreaks, although there is little information to date on whether this has resulted in improvements that can effectively prevent/control future outbreaks (a recently concluded PVS evaluation is bound to shed more light on this). Our analysis and comparisons of data on the committed national budgets for 2006-10 under the Operational Programme for avian influenza (animal health component) against real and projected costs of the outbreaks reveal the relative scale of the costs and benefits involved. These conclusions are supported by other work reviewed from available literature. For example:

- The total commitment on animal health under the 2006-10 OPI (excluding control costs in the event of an outbreak) comes to some US$ 70 million for the 5 year period, while the total direct and indirect costs from the outbreak in 2004 alone is (conservatively) estimated at US$ 300 million.

- Investing in disease investigation and strengthening VS over the same period would cost public coffers a total US$ 30 million, compared to total direct production costs and losses during the 2004-05 outbreak of US$ 62 million a year and excluding consequential on-farm losses.

- Adding consequential losses, our projections of the total direct impact under the most likely scenario (which is milder than the 2004-05 epidemics) come to US$ 115 million a year.

In a country where two thirds of the production is run by small holder systems and over two thirds of farms keep poultry, this analysis also demonstrates the potential benefits of improved prevention in terms of social equity and poverty alleviation (and even food security). Relatively the largest direct losses were felt by small scale, often indebted, commercial chicken producers, while Vietnam's millions of farm households with small numbers of poultry were also affected. Against this, investment in bio-security is estimated to require at least US$ 500 million for minimum improvements in the next 10 years, a cost prohibitive to small rural farmers.

Nigeria

The experience of Nigeria in this area is relatively more recent and more limited compared to Vietnam. However, both the government and international community are concerned of the potential risks and ramifications of these outbreaks in the context of the extensive presence of rural/urban backyard farming, relatively weak biosecurity, and the socio-economic importance of the sector.

Our analysis and comparisons of data on the planned commitments for 2006-10 under the WB integrated plan for the control and eradication of avian influenza as well as under the ALIVE needs assessment for Nigeria, against real and projected costs of the outbreaks, reveal the relative scale of the costs and benefits involved. For example:

- The total commitment on animal health under the 2006-10 WB plan (excluding control costs in the event of an outbreak) comes to some US$ 22.6 million for the 5 year period (or an average US$ 4.5 million per year), while the direct costs from the outbreak in part of last year alone is (conservatively) estimated at US$ 8.4 million and excluding consequential on-farm losses.

- Investing in strengthening disease surveillance and veterinary quarantine would cost a total US$ 10 million over the same period, or US$ 2 million a year which is less than 25% of the above conservative estimate.

- The relative scale of this investment is even more evident when adding consequential losses, with our projections of the total direct impact under the most likely scenario (which is milder than the 2006 epidemic) reaching US$ 113 million a year.

In a country where two thirds of the official (registered) production is run by small holder systems and poultry rearing is central to the survival of poor rural and urban communities, this analysis also demonstrates the potential benefits of improved prevention in terms of poverty alleviation and food security.

Romania

The country's VS have undergone significant restructuring and upgrading in the run up to EU accession (Romania became an EU member on 1 January 2007). Having suffered a large number of outbreaks since 2004, this country was relatively recently declared HPAI-free.

Our analysis and comparisons of data on the planned commitments for 2006-09 under the WB integrated plan for the control and eradication of avian influenza, against real and projected costs of the outbreaks, reveal the relative scale of the costs and benefits involved, and the interest in investing further in improved structures and surveillance systems. For example:

- The total commitment on animal health under the 2006-09 WB plan (excluding control costs in the event of an outbreak) comes to some US$ 12.6 million for the 3 year period (or an average US$ 4.2 million per year), while the direct costs from the outbreak in the six months of 2005-06 outbreak alone were estimated at US$ 67.6 million, excluding consequential on-farm losses (Figure 15).

- Investing in strengthening disease surveillance and diagnostics would cost a total US$ 11 million over the same period, or US$ 3.6 million a year which is less than 0.5% of the above conservative estimate.

- The relative scale of this investment is even more evident when adding some ripple and spill-over effects, bringing the total impact at some US$ 211.6 million, as a consequence of the effects of the October 2005 to May 2006 outbreak.

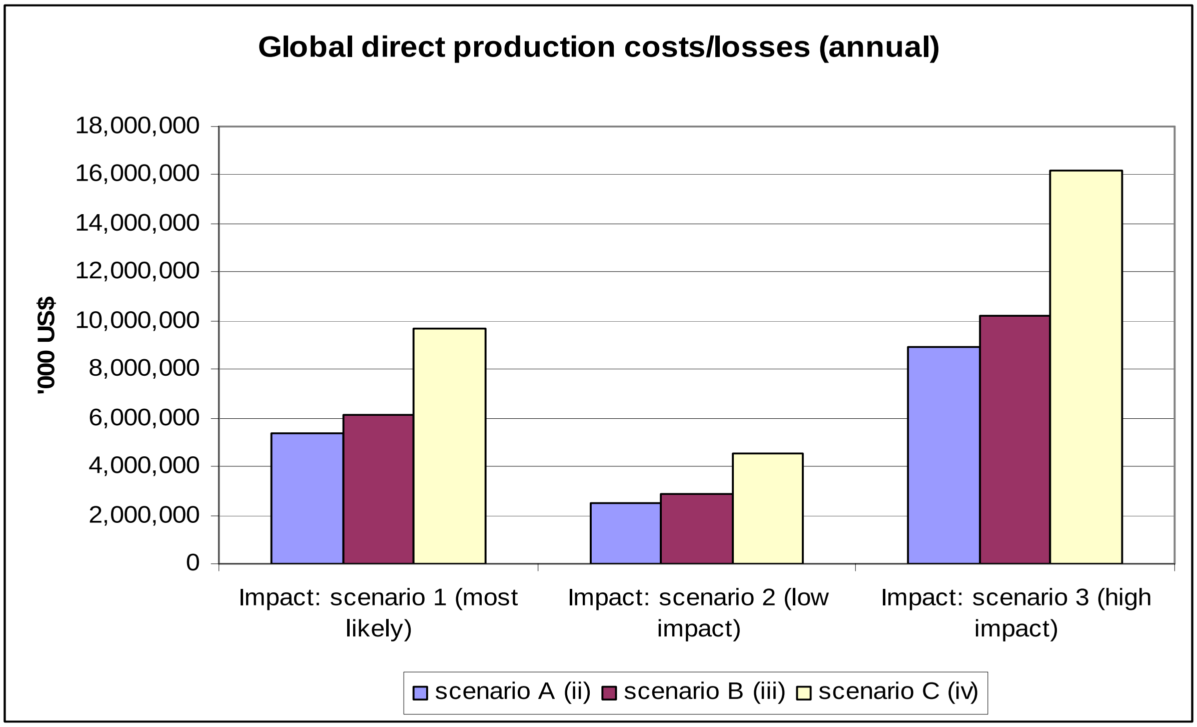
Modelling of prevention costs versus outbreak costs

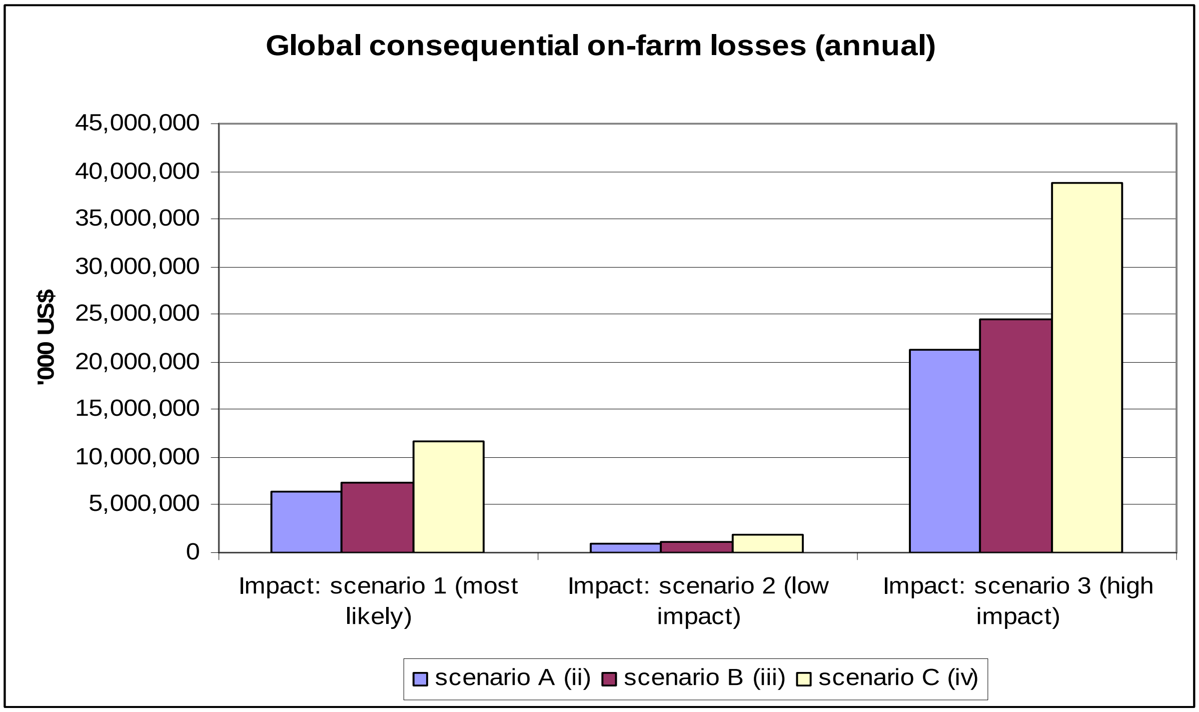
Drawing on the analysis undertaken in the previous steps, the study provides a global overview of prevention costs versus outbreak costs for HPAI by developing a specific analytical tool incorporating a baseline, scenarios and assumptions on key parameters from which to estimate the detailed direct and indirect costs of a disease outbreak.

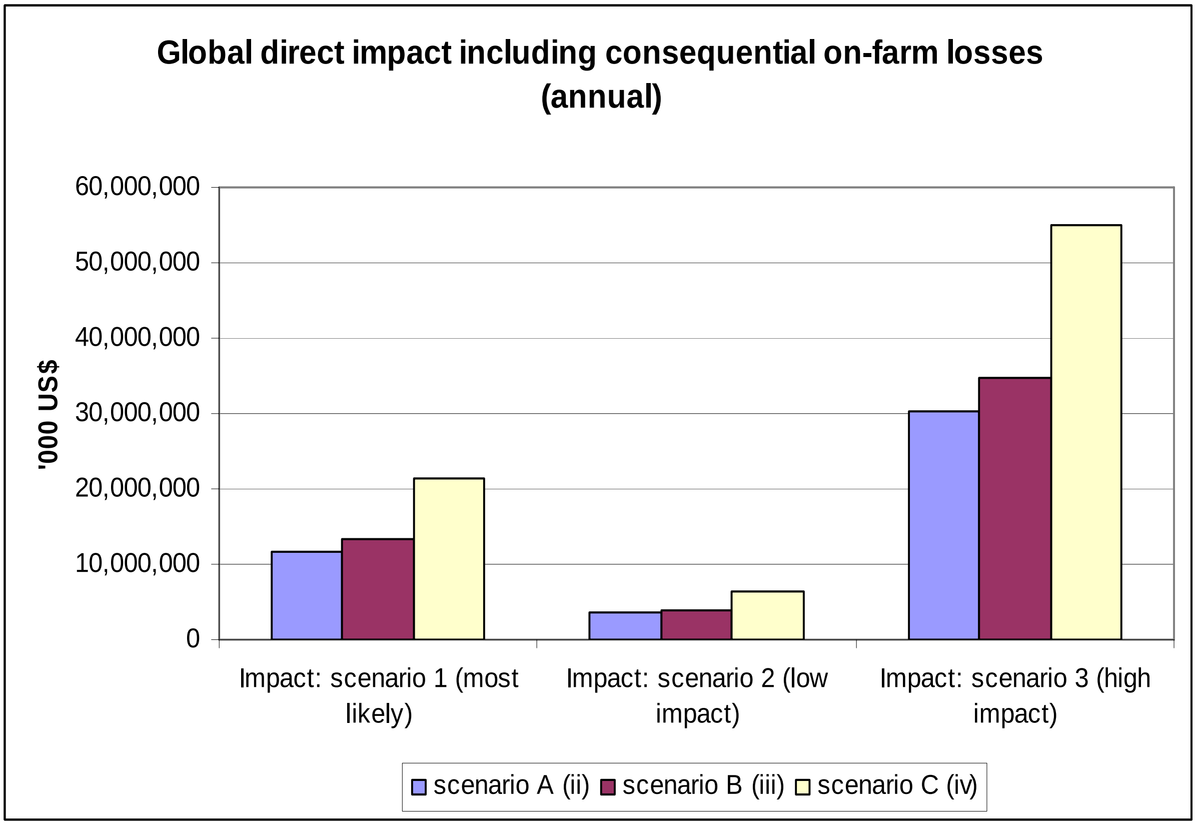
At a country level the “most likely”, “low impact” and “high impact” scenarios vary in terms of the duration of the impact of the epidemic and the intensity of disease spread within countries. At a global level the three scenarios used are formulated on the basis of the geographical coverage of the disease worldwide, with scenario A including only H5N1 infected countries, scenario B infected and ‘non infected at immediate risk’ countries, and scenario C all developing/transition countries that are members of the OIE.

The range of outcomes in relation to **direct costs and losses** under the different scenarios are indicated in **Figure A**. The results for scenarios A and B tend to be very similar, reflecting the relatively small number of countries added under scenario B, given the current state of HPAI outbreaks worldwide. If this position changes, with a more substantial geographical spread of the disease, the impact would start moving closer to the substantially higher figures of scenario C. Thus, total direct costs and losses (excluding consequential on-farm losses) in scenarios A and B are estimated at US$ 5.3 billion and US$ 6.1 billion respectively (on an annual basis), but would rise up to US$ 9.7 billion if the disease were to spread throughout the developing world. Including consequential on-farm losses, the total direct impact would be US$ 11.7 billion and US$ 13.5 billion respectively in the case of scenarios A and B, but could rise up to US$ 21.3 billion if the disease was to spread more worldwide along the lines suggested by scenario C.

Figure A: Overview of estimated direct impacts under the different scenarios, HPAI (i)




Global consequential on-farm losses (annual)
'000 US$
45,000,000
40,000,000
35,000,000
30,000,000
25,000,000
20,000,000
15,000,000
10,000,000
5,000,000
0
Impact: scenario 1 (most likely)
Impact: scenario 2 (low impact)
Impact: scenario 3 (high impact)
scenario A (ii)
scenario B (iii)
scenario C (iv)


Global direct impact including consequential on-farm losses (annual)
'000 US$
60,000,000
50,000,000
40,000,000
30,000,000
20,000,000
10,000,000
0
Impact: scenario 1 (most likely)
Impact: scenario 2 (low impact)
Impact: scenario 3 (high impact)
scenario A (ii)
scenario B (iii)
scenario C (iv)

Notes:
(i) Includes animal value losses, culling/disposal and control costs
(ii) Scenario A includes the following countries: Cambodia, China, Indonesia, Laos, Thailand, Vietnam, S. Korea; Mongolia, Kazakhstan, Russia, Turkey, Romania; Nigeria, Niger, Sudan
(iii) Scenario B includes the countries of scenario A plus: N Korea, Malaysia, Brunei, Myanmar, Singapore, Philippines; Bangladesh, Bhutan, India, Nepal, Sri Lanka
(iv) Scenario C includes all developing/transition countries, members of the OIE (132 countries in total)

Source: *"OIE Del1 global costs analysis.xls"*, Agra CEAS Consulting.

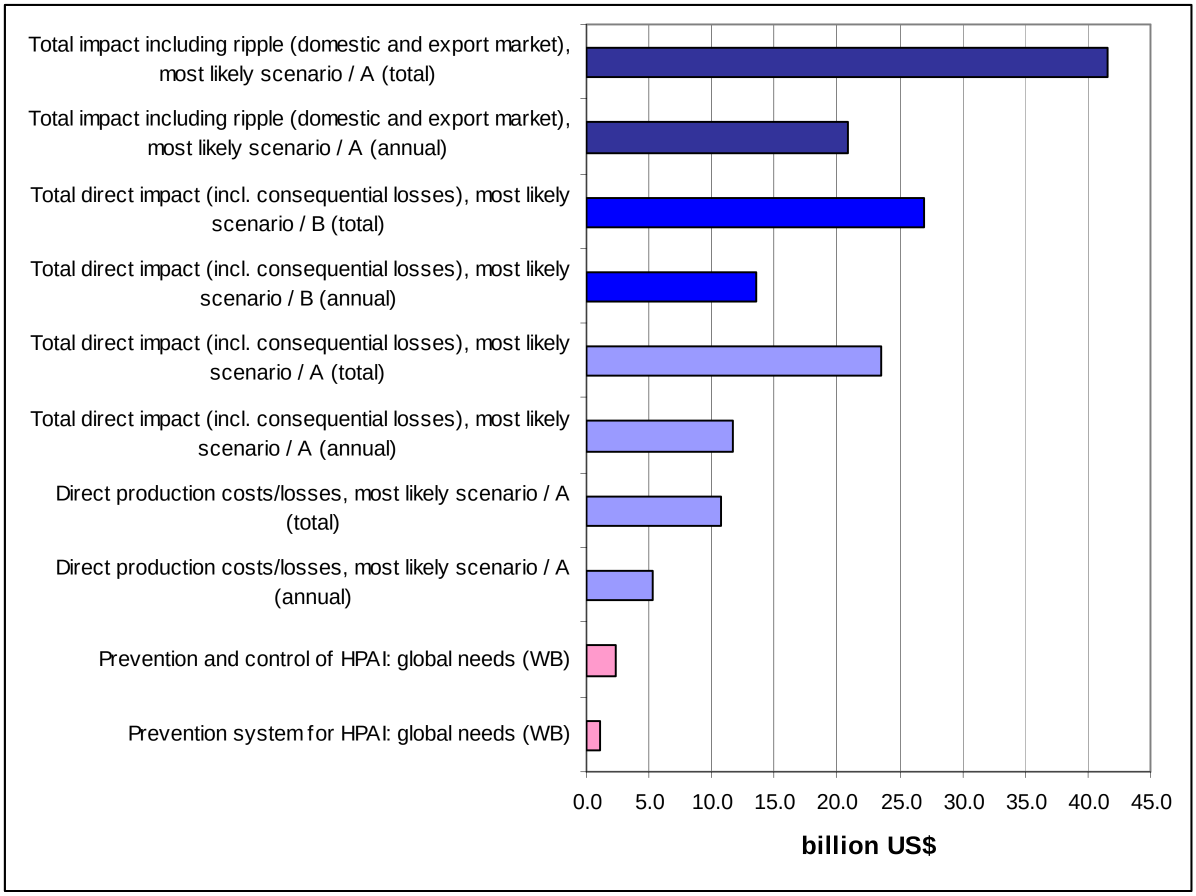
The various **indirect costs** in the event of an HPAI outbreak have been estimated as a range between 3 possible outcomes from the 3 main scenarios ('most likely', 'low impact' and 'high impact'). Global estimates of the indirect impact under the 'most likely scenario' are presented on an annual basis and in total terms (i.e. depending on the duration of the impact of the epidemic). Under the 'most likely' scenario, ripple costs are estimated at US$ 5.3 billion in terms of domestic market losses in the poultry sector and a further US$ 3.8 billion in terms of export market losses on an annual basis. Assuming a 2 year duration of impact, as is currently the case under the 'most likely' scenario based on real market baseline trends, the total ripple impact in terms of domestic and export market losses in the poultry sector would be double the above amounts (i.e. to US$ 10.6 billion and US$ 7.5 billion respectively).

The considerable extent to which the relative value of **spill-over** (tourism) and **wider society (human pandemic) costs** outweigh the ripple effects is also highlighted. In the case of spill-over effects in the tourism sector alone, these are estimated to amount to US$ 72 billion on an annual basis under the 'most likely' scenario and double that amount assuming a 2 year duration of the impact (i.e. US$ 144 billion). Wider society costs, in the event of a human pandemic, are several multiples of all costs, and depending on the severity of the outbreak these are estimated at US$ 311.2 billion (at a 15% attack rate), and at US$ 711.2 billion (at a 35% attack rate) on an annual basis alone. It should be noted that these costs are the minimum expected outcomes, as they exclude certain types of indirect impacts for which it has not been possible to provide estimates on a global scale. Such impacts include ripple effects on upstream/downstream industries (raw material suppliers, catering and distribution, wholesale markets, employment in the sector etc.), spill-over effects (e.g. on the services industry) and other wider society costs (e.g. environmental effects).

In this context it is noted that the aim of this study has been to develop a flexible tool, rather than solely providing estimates. This means that the baseline, the assumptions and the scenarios can be improved/refined at any point in time, as further research and evidence on a disease impact becomes available. This tool allows a flexible approach, which highlights the relative importance of the various direct and indirect impacts, so as to provide direction to policy-making in this field. It should also be noted that in this report this tool has been developed specifically for the case of HPAI, but it has the potential to be adapted for application in the case of other TADs such as FMD.

Comparing the global cost of prevention and preparedness with that of an outbreak in the case of HPAI, the most recent global needs assessments of prevention and response to HPAI suggest that some US$ 2.27 billion would be required over a 3-year period. Of this amount, prevention and preparedness costs as such account for just over US$ 1 billion. Against this assessment, outbreak costs under the 'most likely' scenario and for H5N1 countries only are estimated at US$ 5.34 billion per year for the direct production costs and losses alone (excluding consequential losses) (**Figure B**). Adding consequential on-farm losses, the total direct impact comes to US$ 11.75 billion per year. Assuming the impact of an outbreak spread over a period of 2 years ('most likely scenario') the total direct impacts would be US$ 10.7 billion excluding consequential on-farm losses and US$ 23.5 billion if these losses are included. Moving towards scenarios B and C these costs increase further to US$ 12.3 billion and US$ 26.9 billion respectively (in the case of scenario B) and to US$ 19.4 billion and US$ 42.7 billion respectively (in the case of scenario C). Before even considering the indirect impacts the benefits of improved prevention therefore by far outweigh the potential outbreak costs and losses.

Figure B: Prevention versus outbreak costs: comparison under various scenarios, HPAI



Notes:
HPAI global needs figures are totals over a 3 year period;
Incremental operational costs (a significant part of the total costs of strengthening VS) are excluded from these calculations, due to lack of data;
Outbreak costs are quoted in annual and total amounts (total here refers to the duration of the impact, which is assumed to last for 2 years in the most likely scenario).

Source: *"OIE Del1 global costs analysis.xls"*, Agra CEAS Consulting.

The report concludes by noting that it is difficult to predict the severity of the threats posed by Transboundary Animal Diseases (TADs). Moreover, different issues arise depending on the nature of the disease. A disease such as HPAI, with its high public health relevance, poses a different set of challenges than a disease such as FMD which has purely commercial and socio-economic implications. Both diseases, however, have the potential to lead to substantial and even devastating consequences in terms of increased poverty, decreases in food security and social equity/stability in developing/transition countries.

At the same time, the current state of Veterinary Services (VS) and preparedness levels in developing/transition countries pose a real and present threat to the prevention and control of TADs. As is demonstrated in the case studies and from the literature review, the various identified weaknesses essentially revolve around the key issue of the lack of funds and/or poor governance. Within a weaker economic environment and while these countries are struggling to catch up with the rest of the world, it is evident that VS have not been – more importantly have not consistently been – a priority in the use of relatively constrained public funds. Today more than ever, with increasing globalisation, the world's 'developed' and 'developing/transition' countries are so interconnected that both the effects of TADs and the measures to prevent them cannot be viewed in isolation. This calls for a global approach in the fight against animal diseases and it is clear that the veterinary services have a crucial role to play here as the providers of Global Public Goods.

1. Introduction

1.1. Aim of the study

This is **Part I** of a series of economic studies on the financing of animal epizootics and zoonoses losses in developing and transition countries, commissioned by the OIE with support of the World Bank.

Part I deals with the economic impact of diseases and cost-benefit analysis of improved disease prevention and rapid control. The objectives of this study, as laid down in the ToR, are as follows:

"To clarify the relative direct and indirect impacts and the economic cost of different types of animal diseases and assess the costs and benefits of global and national animal disease prevention and control, in particular through appropriate governance allowing early detection and notification and rapid response within all parts of a country. The cost of the appropriate governance (in compliance with OIE international standards) will be compared with the potential cost of sanitary crisis resulting from diseases such as BSE, FMD and avian influenza".

This Report details the work undertaken in Part I, which was carried out by Agra CEAS Consulting. It describes the methodology followed, the scope of the analysis, and our key findings and conclusions.

1.2. Structure of the Report

The structure of this Report is as follows: Section 2 outlines the key methodological tools employed for the study. Section 3 outlines the scope of the study in terms of disease focus, developing country and farming system coverage, the description of prevention and control systems, and the definition of prevention and outbreak costs and of the potential benefits of improved prevention. Section 3 provides a synthesis of the main findings from the literature review. In particular, this includes an assessment and conclusions of existing information and applied research on the costs of prevention and control systems, on the costs of outbreaks, and of relevant cost-benefit analysis of improved prevention. Section 5 covers the four country case studies that were undertaken, in each case outlining the context (animal health problems, and veterinary services structures), and then the costs of prevention versus the costs of outbreaks. Section 5 provides a global (worldwide) overview of prevention costs versus outbreak costs (the latter based on a specific model developed explicitly for the purposes of this study, as presented in Annex 5). Section 6 outlines the overall study conclusions and recommendations (more detailed conclusions and recommendations are also provided per section within the study).

2. Methodology

The main methodological tools employed in Part I have included:

- Desk research: identification of relevant literature and data from key sources in the animal health field (including all the major competent international, regional and national bodies). This has included the construction of a detailed and extensive literature database, which is provided as a **separate deliverable under Part I**;

- Literature review: analysis of the available literature. The analysis has focused on extracting the key information and conclusions of relevance to our study. This has covered nearly 300 references of relevance. This analysis is also provided as a **separate deliverable under Part I**;

- Consultations with key relevant institutions/authorities and experts. This has included both relevant information/data gathering and advice on the methodology and direction of the study;

- Case studies in 4 countries: Argentina, Vietnam, Nigeria and Romania. The criteria used for the selection of these particular countries have included regional representativeness (so as to cover the key world developing regions), the extent/threat and relevance of disease outbreaks (in connection with HPAI and FMD in particular), level of economic development and trade orientation (so as to cover a range of socio-economic profiles);

- Development of a model to provide detailed estimates of the costs of outbreaks (detailed types of direct and indirect impact), with application to the particular case of HPAI. This model is presented in full (baseline, scenarios, assumptions, and results) in **Annex 5**.

- Analysis and synthesis of costs and benefits. This has focused on the comparison of prevention versus outbreaks costs, so as to derive conclusions on the cost and benefit of improving the prevention and control systems in the animal health field.

3. Scope

3.1. Disease focus: TADs

The focus of this project has been on Transboundary Animal Diseases (TADs), particularly of high zoonotic potential. Transboundary animal diseases are defined as those that are of significant economic, trade and/or food security importance for a considerable number of countries, which can easily spread to other countries and reach epidemic proportions and where control/management, including exclusion, requires co-operation between several countries.

The occurrence of such diseases and their control and eradication poses significant challenges for the world's **Veterinary Services** (VS)[3] and entails substantial socio-economic costs, especially in the context of developing countries' poverty alleviation and development objectives. In addition, many of these diseases have high public health relevance and have become virtually endemic in many parts of the developing world, as demonstrated in **Annex 1**.

Amongst TADs, the project has focused in particular on two diseases of potentially high socio-economic impact, which today present some of the most significant challenges for VS world wide:

- **Highly Pathogenic Avian Influenza (HPAI):** The start of the current 'H5N1' subtype of HPAI epizootic occurred at the end of 2003 in parts of SE Asia[4]. By the end of 2005, the disease had spread to parts of Central Asia, Siberia, the Balkans, the Middle East and Eastern Europe, while at the beginning of 2006 it spread to parts of Western Europe and Africa. The latest situation of the HPAI occurrence since 2003 (number of outbreaks and geographical occurrence) is shown in **Annex 2** (source: OIE WAHID). According to the OIE (A279), the rate and pattern of the spread suggests that the reaction of the international community has not been timely enough. This disease has high public health relevance and significant socio-economic implications.

- **Foot and Mouth Disease (FMD):** Although of limited public health importance as such, FMD has had extensive socio-economic impacts[5] wherever it has occurred (whether in the developed or in the developing world), while its control and eradication has attracted significant efforts and

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[3] This term encompasses the full range of public and private components of national, regional and international veterinary systems. The World Organisation for Animal Health (OIE) *Terrestrial Animal Health Code* defines the Veterinary Services (VS) of a country or group of countries as 'the national Veterinary Administration, the Veterinary Authorities and all persons authorised, registered or licensed by the Veterinary Statutory Body', and both the public and private components of national mechanisms for the control and prevention of animal diseases (*Terrestrial Code* 16th edition, OIE, 2007).

[4] The HPAI virus has been present in China since at least 1996 and probably disseminated to Southeast Asian countries at least some months before it developed into the epidemic beginning in 2003.

[5] FMD was chosen amongst a range of diseases that affect the poor in developing countries. The impact of FMD is exerted mainly through its implications on trade and market access (see for example A129).

resources in most parts of the world. The latest situation of the FMD occurrence is shown in **Annex 2** (source: OIE WAHID).

3.2. Classification of developing countries

The analysis covers all developing and transition countries which are members of the OIE[6]. For the purposes of this analysis, countries have been classified according to certain parameters, which include the region, economic criteria such as the level of economic development (per capita GDP), and trade interest (export or import orientation) (**Annex 3)**. This classification is used to determine categories of countries with common parameters, to facilitate the global overview.

There are wide differences in the socio-economic situation (ranging from very poor to relatively wealthy) of developing/transition countries which are members of the OIE (A40).

For example, in Asia, the countries currently infected with HPAI H5N1 (such as Cambodia, Indonesia, Lao PDR, Thailand, Vietnam, China) have significant differences in living standards, economic prospects, per capita income and population size and density. Lao PDR and Cambodia have the lowest per capita incomes in the region, whereas Thailand belongs to the group of newly industrialising countries. The vast majority of the poor in all these countries lives in rural areas and depends on mixed farming systems that include some level of livestock production.

These differences have implications in terms both of the impact of diseases on the macro and micro-economy and the incentive/available means to invest in prevention. Countries where poverty alleviation is the main concern have different problems and goals than large exporters whose main motivation is to improve their competitive position in export markets. Indeed, with respect to the most cited benefits of improving prevention – enhanced food security, poverty alleviation and improved market access – country positions can differ significantly as a function of their general level of development.

Improvements in animal health and more generally the livestock sector can contribute to the micro and macro economy of a country for the attainment of the following goals:

- To ensure both national and household food security;
- To reduce poverty through generation of employment, income and savings;
- To contribute to economic growth though trade in livestock and livestock products and supplying raw materials to industry.

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[6] This includes some 132 country members at the time of the analysis. The current full membership of the OIE (all countries) includes 170 countries.

These objectives fall within the broad framework of the Millennium Development Goals adopted by the UN General Assembly in 2000[7].

Certain indicators can be used to measure the extent of the difference in the importance of these goals between countries. In particular, the following key socio-economic variables and indicators have been included in our country classification:

- GDP per capita and the Human Development Index (HDI[8]) as indicators of relative wealth.
- Share of agricultural sector in total GDP, and LSUs (livestock units) per person, as indicators of the contribution of agriculture and livestock to the economy. These indicators provide measures of the relative importance of the sector in the macro-economy. Used in conjunction with poverty measures (such as the UNDP HDI), they can indicate the socio-economic dimensions of the sector, from which conclusions can be drawn for the sector's importance both in macro-economic and in micro-economic terms. In countries with a high incidence of rural poverty / poor ranking on the HDI the sector is expected to play a greater role in poverty alleviation, particularly when combined with high rates of LUs per person;
- Share of agricultural exports in total value of exports, and net trade position (exports minus imports of livestock products) as an indicator of trade orientation. This indicates the relative importance of the sector in trade terms. Countries have been consequently classified as (net) exporters or (net) importers.

This has allowed us to classify countries in clusters, from which conclusions can be drawn with respect to the different interests and position of each cluster in terms of animal health prevention and the relative impact of animal disease outbreaks. The complete analysis and classification of each country can be found in **Annex 3**.

3.3. Farming systems

It is important to differentiate between farming systems because the impact and hence cost of a particular disease can vary significantly depending on the production system. FMD, for instance, will cause higher production losses in dairy herds than in beef herds. Similarly, HPAI, affects smallholder poultry systems differently than commercial large-scale poultry based systems: in medium to small holder poultry farms, which tend to have a medium to low level of biosecurity, animal mortality is higher than in intensive production systems (where biosecurity tends to be higher), but the latter inevitably suffer from a higher rate of financial risk due to the higher poultry concentration levels (A14)[9]. Fast transmission of diseases within areas of high livestock density (brought about by the intensification of production over the last 30 years) has led to large economic losses in the developed world (e.g. UK FMD), and this danger is now believed to be more acute in the developing world where veterinary and human health services generally tend to be weaker (A58).

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[7] At the millennium summit of the United Nations in September 2000, all the 189 member nations joined in a formal commitment to reduce global deprivation, including poverty, hunger, poor health and abuses of human rights. This commitment was taken into a series of Millennium Development Goals (MDGs) to be achieved by 2015.

[8] A composite index measuring average achievement in three basic dimensions of human development—a long and healthy life, knowledge and a decent standard of living. For details on how the index is calculated, see UNDP statistics.

[9] E.g. the FAO recommendations on AI prevention in Asia state that the probability of infection is higher in backyard and village farms (production sectors 3 and 4) than in commercial/semi-commercial ones (sectors 1 and 2), however,

The livestock sector in developing countries has experienced phenomenal growth in the last decade, to the extent that the literature widely refers to this as the '*livestock revolution*'. This has been fuelled mainly by economic growth, population growth, urbanisation and the resulting global expansion in demand for food of animal origin (A58, A96, A111c). Nonetheless, substantial differences remain in the livestock structures and farming systems between the developing countries examined here, due to differential extent and nature of livestock sector growth in each country/region. These mirror the general levels and patterns of economic growth in the various countries, but also reflect more historical factors such as the fact that livestock fulfils different goals from region to region, between countries and even within different regions of a country. Thus, at international level, there has been considerable variation in terms of the livestock sector's contribution to economic development and the achievement of Millennium Development Goals[7]. For example some parts of the developing world, in particular sub-Saharan Africa have lagged behind in the phenomenon of the livestock revolution which has characterised other developing regions[10]; even between African countries, the livestock sector has experienced differential patterns of development, whether supply or demand induced (A187). Thus, the resulting structures of the livestock sector can vary considerably between the developing countries under review.

The FAO have established a typology of poultry production systems, which has been followed in the 2004 FAO recommendations on AI prevention in Asia (A14). This typology has been used in a number of studies on the impact of HPAI and compensation issues (FAO: A91, A159), for the analysis of the type of impacts the disease has caused to the various farming systems and implications for effective compensation as a control measure. The FAO typology distinguishes between 4 'sectors': in sectors 1 and 2 production tends to be large-scale, highly integrated, with well-organised bio-security systems and quality control processes in sectors which usually tend to be more export-oriented; sector 3 farms are commercially oriented and can be fairly medium scale but tend to be less bio-secure; sector 4 is what the literature widely refers to as 'backyard' farming or minimum input – minimum output systems with low bio-security levels but high importance for the survival of poor rural populations (i.e. central to food security and poverty alleviation).

This typology has been applied in a number of country studies including Vietnam (A16, A159) and Nigeria (A293), which are two of the case studies presented here. The majority of developing countries have predominantly sector 3 and sector 4 poultry systems, but in newly industrialised and key livestock product exporting developing countries - such as Brazil, Malaysia and Thailand - poultry systems are closer to sectors 1 and 2 as is the case in the developed world (A159). An illustration of the differential impact a disease can have in the various production systems is the fact that in emerging countries that have experienced HPAI, such as Indonesia and Vietnam, sector 3 which was previously expanding and

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if the virus enters the latter, infection may have a greater impact due to the concentration of susceptible poultry in these farms.

[10] Mwangi D M and Omore A 2004 The Livestock Revolution - a view on implications for Africa. British Society of Animal Science, Penicuik, UK.

increasingly prevalent appears to have shrunk dramatically. The evidence therefore strongly suggests that the HPAI crisis has accelerated the sector's restructuring.

It is stressed that the situation is very dynamic, as the livestock sector in the developing/transition countries is evolving rapidly within some of the fastest growing economies and populations in the world (e.g. China). Globalisation, the changing focus of agricultural development, and the changing production and consumption patterns all have implications for the provisions of animal health services (A66). Population growth, increasing income and urbanisation are causing a marked increase in demand for livestock products in the developing/transition world. According to IFPRI projections, the number of people in the world is projected to be 7.7 billion by 2020, with the largest increase coming from the developing world. If current trends continue, there will be a significant percentage of people in developing/transition countries whose diets will be modified from plant-based to meat- and dairy-based. To supply these needs, it is estimated that global livestock production in 2020 will have to be at least double the 2000 levels (A96).

3.4. Description of prevention and control systems

3.4.1. Overview

The prevention and control of animal diseases[11] involves a series of measures taken ex ante and ex post in response to an anticipated disease outbreak, moving from short term control and containment (in the event of first occurrence of an outbreak) to medium term (activities followed after short term control measures), to longer term (following eradication or return to a 'normal' situation).

The WTO SPS Agreement recognises the OIE as the relevant international organisation responsible for the development and promotion of international animal health standards, guidelines, and recommendations affecting trade in live animals and animal products. An overview of the OIE provisions, as outlined in the OIE Terrestrial Animal Health Code, is provided in **Table 1**.

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[11] This section deals only with the animal health aspects of prevention strategies. The human health aspects are covered by WHO material, including the results of the 2005 Lyon conference on strengthening national capacities for epidemic preparedness and response in support to national implementation of international regulations (A214), and the WHO contribution to the Geneva 2005 meeting on Avian Influenza (AI) Emergency Preparedness and Response (A223).

Table 1 Overview of OIE international standards, guidelines and recommendations (a)

Components of prevention and control systems	**OIE provisions**
General provisions	
Disease notification	Member Countries obliged to notify within 24 hours epidemiological information with regards to occurrence/ reoccurrence of listed notifiable diseases, the occurrence of a new strain of a listed disease, a significant change in the epidemiology of a listed disease or the detection of an emerging disease. Reports within specific time limits should be sent on the presence or the evolution of the listed diseases
International trade	Importing and exporting Member Countries responsibilities in exchanging up-to-date health information, setting import regulations and providing accurate health certification.
Disease risk analysis	Guidelines and principles for conducting risk analysis associated with the importation of animals and animals products. The Terrestrial Code provides the descriptions of the components of import risk analysis: hazard identification, risk assessment, risk management and risk communication.
Zoning/ compartmentalisation	Recommendations for establishing and maintaining a free zone or compartment for a particular disease within a Member Country.
Equivalence of sanitary measures	Guidelines to assist OIE Member Countries to determine whether sanitary measures arising from different animal health and production systems may provide the same level of animal and human health protection
Veterinary Services	The Veterinary Services of the Member Countries should comply with fundamental ethical, organisational and technical principles established by the OIE to demonstrate the integrity of its international veterinary certificate. Guidelines are provided for the evaluation of the quality of the Veterinary Services, which should be applied using the OIE Performance, Vision and Strategy (PVS) instrument.
Specific diseases	
e.g. HPAI, FMD	Measures that exporting Member Countries need to undertake in order to export, including requirements, which should be met by

Components of prevention and control systems	**OIE provisions**
	a country/ zone/ compartment in order to achieve a specified disease status e.g. free country, free zone with vaccination, etc. The measures incorporate the latest scientific information, and diagnostic and vaccination techniques. For certain important diseases, appendices describe surveillance methods to be implemented for the determination of the status of the country or zone.

(a) For animal health and zoonoses, the SPS Agreement refers to the 'standards, guidelines and recommendations developed under the auspices of the OIE'.

Source: OIE Terrestrial Animal Health Code

The measures involved can vary by disease, as described in the OIE Terrestrial Animal Health Code and in the OIE Technical Disease Cards (**Annex 1**). A more detailed description of the international strategy and measures for the control and prevention of the two main TADs discussed here, HPAI and FMD, is provided below. Our objective has been to establish the main cost components involved in implementing these measures (as discussed in section 3.4.3). Control measures in the event of a disease outbreak as such and their costs are discussed in more detail separately under section 3.6.

Veterinary Services[12] (VS) are at the very core of the prevention, control and eradication of animal diseases. As such, their ability to effectively safeguard the livestock sector from such diseases will be crucial for the protection both of public health and of rural livelihoods (in terms of food security and poverty alleviation, as discussed in section 3.2). These objectives are commonly classified in literature as '*public goods*' (A35)[13]. The provision of VS could be defined as an intermediate public good, the final public good being to guarantee the above objectives.

A public good provides benefits to a large number of people (potentially everyone), without reducing the benefits that each individual may derive from it[14]. The control and eradication of communicable diseases is classified as a de facto public good on both grounds; the broad objectives of economic stability and growth and development potential are also listed under the same heading (A35c).

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[12] The OIE *Terrestrial Animal Health Code* defines the Veterinary Services (VS) of a country or group of countries as 'the national Veterinary Administration, the Veterinary Authorities and all persons authorised, registered or licensed by the Veterinary Statutory Body', including both the public and private components of national mechanisms for the control and prevention of animal diseases.

[13] See, for example, the various contributions on this subject included in A35.

[14] Conventional economic theory defines public goods as being non-rival in consumption and having non-excludable benefits, i.e. having the opposite characteristics of private goods (A35b). According to this standard definition the market cannot price these goods efficiently, which justifies government intervention. A more expanded definition, which is not anchored necessarily on non-rivalry and non-excludability, takes into account deliberate policy choices that affect the nature and benefits of goods (A35c).

Furthermore, the publicness of the response is an important factor for classifying a public good (A35a). This concept has been applied in the case of communicable diseases (A35c, A35d[15]). Actions to address international health challenges are seen as efforts to enhance the publicness of responses. Indeed, looking at international cooperation on public health since the 1950s, it can be concluded that problems tend to persist when the publicness of the response is limited (A35d).

Given the transboundary nature of some of the most challenging animal diseases, the OIE, along with key donor organisations including the World Bank (WB) and other international/national donors[16], have advocated that the objectives which the core functions of Veterinary Services seek to achieve are a "**Global Public Good**''[17]. The control and eradication of communicable diseases is classified as a global public good on the grounds that, with increasing globalisation and cross-border economic activity resulting in the increase in global systemic risks, this good has become indivisible across borders or transnational (A35, A39, A59, A35d, A94). Some of the other objectives sought by improvements in animal health in developing/transition countries, notably poverty alleviation and promoting food security, are also classified under the same heading.

The main argument followed by the literature is that, given that they are serving Global Public Goods, the available key prevention and control tools to respond to global animal diseases (good governance of Veterinary Services, animal health legislation and policies, disease information, the implementation of international standards, research and development) should be provided and funded in all countries. For reasons of negative externality[18], a special effort should be made by the international community to boost the capacities of developing countries and countries in transition. This takes into account both the interdependence of countries in combating global diseases and the disparities that exist in the capacities, or willingness, of countries to participate in combating them. This logical framework has been followed *inter alia* by the WB in its international activities in this area[19].

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[15] Three inputs are considered crucial for controlling disease: available and accessible medical knowledge, a national public health infrastructure, and private spending on complementary goods and services (A35d).

[16] See for example, UK Joint Industry position (DEFRA, A22).

[17] Global public goods are public goods whose benefits extend to all countries, people and generations. A less strict but more meaningful definition would be when the good benefits more than one group of countries and does not discriminate against any population group or generation (A35). This definition is applicable in the case of some regional communicable diseases such as AI, i.e. in cases where a worldwide epidemic may occur actions to monitor and isolate a regional outbreak clearly constitute global public goods (A39, A59, A94). Even in the case of regional non-communicable diseases, inadequate healthcare responses in any region can have global spill-overs (A59, A35d). Moreover, the public goods associated with communicable diseases provide intergenerational spill-overs of benefits. Once a disease is cured or a virus is isolated, benefits are conferred on the present and future generations (A59).

[18] An externality exists where an action – or inaction – by an individual or country imposes a cost (negative externality) or creates a benefit (positive externality) for others, without this being taken into consideration by the individual or country responsible). This argument has often been used in the case of infectious diseases (e.g. A22, A68).

A global framework for the progressive control of transboundary animal diseases (GF-TADs) was developed by the OIE and the FAO in May 2004, to serve as a facilitating mechanism to provide for capacity building and to assist in establishing programmes for the specific control of certain TADs based on regional priorities (A41). One of the OIE's main objectives, in its Fourth Strategic Plan, is to strengthen the capacity building of the national Veterinary Services, encouraging the improvement of legislation and resources, in order to assist member countries to comply with the (OIE) international standards and guidelines for animal health (including zoonoses) and for safe international trade in animals and animal products. The necessity to strengthen Veterinary Services was also been reaffirmed at the G8 Summit held in St. Petersburg on July 16, 2006[20].

In recent years, the need to ensure a greater transparency and preparedness to deal with emerging and re-emerging diseases, in accordance with the rules and obligations of the WTO SPS Agreement provisions, has been a primary driver in the reorganisation of the role of VS in the developing world[21]. This has involved, at the top level, the clearer delineation of responsibilities between those parts of government concerned with public health and consumer protection and those dealing with the economic issues of meat production and trade. At a lower level, it has necessitated improved surveillance mechanisms, enhanced research and a better prioritisation in the use of the available resources. Recommendations to this effect have been made by the OIE (**Table 1**). However, it is recognised that developing countries may lack the necessary financial and human resources to implement these recommendations and this being a global public good, international organisations and donors need to step in to help promote the required reforms (A139, A134).

Thus a global good governance programme for the improvement of VS in developing countries involving cooperation of the main international organisations and donors (A57) has been set. The programme centres on the concepts of improved transparency, early detection and rapid response to animal disease outbreaks.

Early detection of animal diseases in particular relies on good cooperation between the main actors involved in the system: livestock owners, private veterinarians and animal health services, the public veterinary administration, and the wider food chain[22]. This systemic approach is inherent in the definition of the VS according to the OIE Terrestrial Code[3]. The effective collaboration of these private and public components is in fact a key criterion in evaluating a country's VS using the OIE PVS instrument (A79). In designing future strategies, the chain approach is also emphasised in the SAFFE initiative launched by the OIE in April 2006. This emphasises the partnership between the public and private sectors within the mandate of the VS in order to strengthen the global food safety system[23].

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[19] For example the WB Development Grant Facility (DGF). The DGF was established in 1997 to integrate the overall strategy, allocations, and management of Bank grant-making activities funded from the Administrative Budget under a single umbrella mechanism.

[20] http://en.g8russia.ru/docs/10.html: Conclusion 13. in "Fight against infectious diseases"

[21] It is noted that, under the WTO SPS, developing countries were given a longer deadline, to the vear 2000, to conform to the Agreement.

[22] Further discussion on the respective contribution of the different sectors can be found in section 3.5. For a more extended reading on this see, for example, A57, A66 and A82.

3.4.2. HPAI prevention and control strategy

A Global Strategy for the Progressive Control of Highly Pathogenic Avian Influenza (HPAI) was first developed by the OIE and the FAO in collaboration with the WHO, and presented in November 2005 at a global meeting in Geneva co-sponsored by these organisations and the World Bank. This was subsequently revised, most recently in March 2007 (A40). It is a long term strategy that aims to minimise the global threat and risk of influenza at source in domestic poultry and to prevent exposure of humans, through progressive control of HPAI. The key components of the strategy include control at source in birds, surveillance, rapid containment, pandemic preparedness, integrated Animal and Human Health (AHI) plans involving also other sectors, and communication (**Box 1**). Implementation was designed over three time frames (immediate to short (1-3 years), short to medium (4-6 years) and medium to long term (7-10 years)) and at three levels (national, regional and international).

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[23] The SSAFE initiative is hosted by the University of Minnesota (USA). It intends to provide input from the entire food supply chain, to facilitate and enable progress in strengthening the global food safety system as well as animal disease prevention and control worldwide, and to leverage resources through public-private partnerships for collective action. It counts with partners of the private sector from the global and regional food and feed systems (production, processing and distribution), NGOs, and intergovernmental agencies worldwide. The initiative effectively responds to a widely accepted need: governments in developing and in–transition countries are not capable of raising their animal health and public health infrastructures to the required standards to address avian influenza and other emerging animal diseases without cooperation with the private sector, including farmers and private veterinarians.

Box 1 Key components of a global action plan to control avian influenza in animals and limit the threat of a human influenza pandemic

- ***Control at Source in Birds***. Improving veterinary services, emergency preparedness plans and control campaigns (including culling, compensation, quarantine and movement restrictions and vaccination).
- ***Surveillance***. Strengthening early warning, detection and rapid response systems for animal and human influenza; building and strengthening laboratory capacity rapid confirmation; rapid and transparent notification.
- ***Rapid Containment***. Support and training for the investigation of animal and human cases and clusters, and planning and testing rapid containment activities.
- ***Pandemic Preparedness***. Building and testing national and global pandemic preparedness plans; strengthening health system capacity, training clinicians and health managers.
- ***Integrated Country Plans***. Developing integrated national plans across all sectors to provide the basis for coordinated technical and financial support.
- ***Communications***. Factual and transparent communications, in particular risk communication, is vital.

Source: Global Strategy for the Progressive Control of Highly Pathogenic Avian Influenza, OIE/ FAO/WHO, March 2007 (A40).

This strategy was drawn up before the Africa HPAI outbreaks, so the objective at that time was to progressively control the spread of HPAI, mainly of the H5N1 strain, in domestic poultry of all affected countries of Asia and Eastern Europe, and to prevent the disease from reaching those other regions and countries not until then infected, but at high risk[24]. Thus, the global strategy was adapted by AUIBAR in collaboration with the OIE/FAO to suit African specificities (A258). A vision and an outline of a strategy for the prevention and control of HPAI in Africa was also proposed by the FAO in July 2006 (A285), which is consistent with the initial OIE/FAO Global Strategy of November 2005 and supplements the AU IBAR strategy document.

Specific provisions that exporting Member Countries need to comply with in order to export are laid down in the OIE Terrestrial Animal Health Code (**Table 1**). In addition, since September 2004, the FAO had developed specific recommendations[25] on the prevention, control and eradication of HPAI in Asia[26], as well as detailed guidelines for the surveillance and diagnosis of HPAI in Asia[27] (A14 and A268 respectively). More generally, the FAO developed in 2006 a manual intended to assist national animal health authorities and other stakeholders throughout the world consider the needs for preparing for HPAI, focussing on the necessary measures for the early detection and rapid response to contain the disease (A38).

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[24] Africa was at the time classified as a 'new region at risk' and action was foreseen at a regional level. Only for infected countries (with HPAI: Cambodia, Lao, Vietnam, Indonesia; with H7/H9: Pakistan) and for non-infected countries 'at immediate risk', action was foreseen at both country and regional levels.

[25] A distinction is made here between OIE international standards, guidelines and recommendations (**Table 1**) and FAO recommendations, which are not international standards.

[26] This is a position paper that presents the main scientific and technical issues and recommendations on prevention, control and eradication of HPAI, with a tabulated summary of FAO conclusions and recommendations in annex. They have been prepared with the contribution of several experts and government officials, including from the OIE,

Following these strategies, the World Bank in consultation with the OIE, FAO, WHO and the UN System Influenza Co-ordinator (UNSIC) jointly developed a model that defines key components of the response to avian and human influenza (AHI) at the country, regional, and global levels. This model has been used for the assessment of financing needs and gaps to fight avian flu (Annex A of A89).

At a country level, apart from the rapid outbreak containment measures which are discussed separately here in the context of outbreak costs (including culling, compensation, disposal, post-culling disinfection, and vaccination), key components of the response on the animal health side are as follows:

- **Integrated country plans**. All countries, regardless of their level of risk, should prepare integrated country plans for human and animal health. Country plans should identify clear and common objectives across sectors, with associated results, outcomes, and costs, to which all sectors can contribute. They may also need to provide for the development of policy, legislation, and related strategy work to support the interventions identified.

- **Surveillance and early warning systems (animal health).** Systems for surveillance and early warning involve the enhancement of laboratory and diagnostic capacity; operational support to active and passive surveillance, including routine serological survey, and related information system support; training; and technical assistance and support to research.

- **Communication and coordination.** The most immediate economic impacts of a pandemic may arise not from death or sickness but from private individuals' uncoordinated efforts to avoid infection. Effective communication and coordination is key for governments to minimise panic and disruption and to engage the active involvement of all stakeholders.

These components are part of a medium term strategy (up to 3 years). In addition, longer term objectives would include:

- **Strengthening the capacity of the veterinary system** to deal with animal health outbreaks, especially zoonotic diseases.

- **Restructuring the poultry industry.**

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and the recommendations of the OIE Terrestrial Animal Health Code (13th edition, 2004). These Guidelines reflect the knowledge of HPAI in Asia at the time, and were therefore to under continuous review as epidemiology evolved and scientific knowledge and management tools became more comprehensive.

[27] The purpose of this document is to provide guiding principles and minimum requirements for surveillance and diagnosis of H5N1 highly pathogenic avian influenza (HPAI) that can be applied by countries and regional networks in Asia. OIE recommendations are to be read in conjunction with this document.

In all these activities there are roles for both the public and private sectors.

At the regional level, important cross-country activities provide support to countries facing similar sets of challenges. Regional activities should not duplicate country-level activities. They could include: support for reference laboratories (when these are set up to serve a region rather than an individual country); coordination of activities undertaken across countries on implementation policies, surveillance methods, and control measures, given the transboundary nature of the disease; assistance to capacity building, in response to demands made to regional organisations by countries; direct support for regional bodies (including animal health organisations, regional organisations, and technical organisations[28]), building on existing infrastructure and mechanisms such as the Global Framework for the Control of Transboundary Diseases (GFTADs, developed by OIE/FAO) and the Global Early Warnings System (GLEWS, sponsored by OIE/FAO/WHO); support to communication activities (e.g. meetings, workshops and data exchange provided by regional/international organisations; r*esearch on regional issues.*

At a global level, various support activities can complement those at the country and regional levels, including support to the following: standard setting and global strategy development (OIE and FAO); support to laboratory networks development of materials and new technologies (e.g. vaccines and antiviral treatments); coordination of the response to avoid duplication and waste; and communication.

3.4.3. FMD prevention and control strategy

The OIE has been particularly active in promoting effective FMD control and surveillance strategies in its Member Countries, especially those where the disease is endemic.

Due to its highly contagious nature and economic importance for many countries, FMD was the first disease for which the OIE established an official list of free countries and zones and prepared guidelines on harmonised methods of FMD surveillance to assist Member Countries in their eradication or control programmes.

The OIE has established categories of freedom from FMD that can be allocated to an exporting Member Country, which have different implications for trade (**Table 1**). These categories are: FMD free country or zone where vaccination is not practised; FMD free country or zone where vaccination is practised; and, infected country or zone (OIE Terrestrial Animal Health Code 2006). The Terrestrial Code provides also Guidelines for the surveillance of FMD. According to these guidelines, an FMD surveillance Programme should include:

- An early warning system and processing chain for reporting suspicious cases. Farmers and workers who have contact with livestock should be trained and report promptly any suspicion of FMD. Samples should be submitted to an approved laboratory. Sampling kits and other equipment should be available and personnel responsible for surveillance should be able to call for assistance from a team with expertise in FMD diagnosis and control.

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[28] E.g., Asia-Pacific Economic Cooperation, Association of South East Asian Nations, FAO, OIE, and WHO regional representations.

- Regular and frequent clinical inspection and serological testing of high-risk group of animals, such as those adjacent to an FMD infected country or zone should be carried out.

The target population of a surveillance strategy should cover all susceptible species. The strategy may be based on randomised sampling or targeted surveillance (e.g. based on the increased likelihood of infection in particular localities or species) depending on the epidemiological situation. The sensibility and specificity of the tests used should be ideally validated for the vaccination/infection history and production class of animals in the target population and an effective procedure for following up positive samples should be in place to increase the level of confidence of the diagnostic tests. Surveillance can be carried out at three levels: clinical surveillance, followed by laboratory testing, virological surveillance and serological surveillance. The strategy and design of the surveillance programme is dependent on the prevailing epidemiological circumstances.

Four strategies are recognised by the OIE in a programme to eradicate FMDV infection following an outbreak. These involve a combination of culling and vaccination (**Annex 1**).

Since 1996 the FAO, through EMPRES[29] and in collaboration with the OIE and PHAO, has supported activities in the context of regional programmes for FMD control and eradication. For this purpose, the FAO developed a manual for the preparation of FMD contingency plans to provide guidelines for the countries threatened by FMD, as outlined in **Box 2**.

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[29] The Emergency Prevention System (EMPRES) against transboundary animal and plant pests and diseases was developed by the FAO in 1996. EMPRES has two components: plant pests and animal diseases. The livestock component focuses primarily on rinderpest but also on 5 other epidemic diseases including FMD. The aim is to promote effective containment and control of the most serious epidemic livestock diseases as well as newly emerging diseases by progressive elimination on a regional and global basis through international co-operation involving early warning, early/rapid reaction, enabling research and coordination.

Box 2 Key components of FMD contingency plans

Nature of the disease: this includes aetiology, evolution and distribution, epidemiological features, clinical signs, pathology, immunology and diagnosis.

Risk analysis for FMD: this process includes hazard identification (i.e. identifying the pathogenic agents which could potentially be introduced in the country), risk assessment (i.e. evaluating the likelihood and the biological and economic consequences of entry, establishment, or spread of a pathogenic agent), risk management (i.e. identifying, selecting and implementing measures that can be applied to reduce the level of risk) and risk communication (the interactive exchange of information on risk among risk assessors, risk managers and the stakeholders).

Prevention strategies: includes import quarantine legislation in line with the OIE International animal Health Code, control movement across national borders, ban of swill feeding from international aircraft or ships, containment of herds to avoid the contact with animals at risk

Early warning contingency plan for FMD: a contingency plan should include training programmes for veterinarians and animal health staff (including stakeholders and traders), strengthening laboratory capacity for a rapid and certain diagnosis, establishing contact with Reference Laboratories and surveillance.

Strategies for control and eradication: This includes *a) Constraining access of the virus to susceptible host animals* through import controls and quarantine; good hygiene and sanitary practices including cleaning, disinfection and safe destruction of potentially contaminated materials; preventing the feeding of contaminated materials to livestock; *b) avoiding contact between infected and susceptible animals* through zoning[30] and quarantine of infected farms or areas and movement controls; *c) reducing the number of infected or potentially infected animals in livestock populations*, through slaughter of infected or potentially infected animals and safe disposal of carcasses; *d) reducing the number of susceptible animals* through destocking or vaccination programmes.

Source: FAO Preparation of FMD contingency plans (A1); adapted for risk analysis with the OIE guidelines from the OIE Terrestrial Animal Health Code.

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[30] Zoning is the proclamation of geographic areas in which specific disease control actions are to be carried out. These areas are usually in the form of concentric “circles” around suspected foci of infection, with the most intensive disease control activities. The **infected zone** is a zone generally of the size of 10 km radius around the disease foci in areas with intensive livestock or 50 km radius in areas with extensive livestock in which actions like quarantine, movement control, slaughter safe disposal of carcasses and decontamination procedures should be taken to limit the spread of the disease. The **surveillance zone** is larger than the infected zone and is subject to control measures to monitor the spread of the disease such as active disease surveillance, movement control and restriction for abattoirs, sale of animals and animal products**.** The **disease free zone** includes the rest of the country, in which strict quarantine measures should be applied to prevent the entry of the disease for the infected zones and continuing surveillance (A1).

Regional campaigns for FMD control and eradication include the South East Asia campaign (SEAFMD) and the PANAFTOSA campaign in the Americas[31]. These campaigns are discussed further in section 4.2.2.1.

3.5. Definition of prevention and control costs

For the purposes of our analysis, prevention and control costs have been defined as the costs incurred by governments during ‘normal’ times, i.e. in advance of outbreaks. In particular, as outlined in **Table 2**, these include:

- Emergency preparedness, in terms in particular of the existence of emergency preparedness plans and the state of VS more generally,
- Surveillance networks, in terms in particular of diagnostic capacity and border controls.

At a disease-specific level, in the case of HPAI, it follows the main components of the FAO/OIE/WHO Global Strategy for the Progressive Control of HPAI (A40). A more complete as well as more detailed list of the various costs involved in the prevention of HPAI – at country, regional and international level – is provided by the World Bank in its assessment of financing needs and gaps for a global response to the disease (A89), and this has been taken into account here.

The costs of prevention will depend on a range of factors, including the nature of the disease and its prevalence in a country (first occurrence, endemic, high risk or low risk etc.) (**Annex 1**), the structure of the livestock sector, and the current situation of the VS and preparedness levels in each country.

For instance, the costs of comprehensive surveillance for HPAI depend *inter alia* on specific conditions in each country in terms of the structure of the poultry sector. In countries where poultry are predominantly kept in smallholder and scavenging systems, i.e. with a geographically/spatially dispersed and difficult to access sector, costs are expected to be high. This applies to Vietnam where 8 million households rear poultry, and Nigeria, but also most of SE Asia and Africa, as will be seen in the case studies.

An overview of the current status quo around the world for the key components of an effective prevention for HPAI is provided in section 4.2.

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[31] There are currently also calls for a regional approach to the eradication and control of FMD in the Middle East and North Africa, according to which a common strategic programme should be adopted, based on risk evaluation, appropriate strategies for control and the establishment of a surveillance network for an early warning system (A180). This is one the regions of the world most heavily affected by FMD, and the situation poses a continuous threat to other regions, especially Europe. In the Middle East, preventive vaccination is used (targeting cattle), albeit as a tool for preventing economic losses caused by the disease rather than as a means of preventing the spread of infection. The diagnostic capacity is limited and the samples are sent to the WRL. In North Africa the management of the outbreaks has recently been focused on emergency preparedness and control measures based on quarantine and mass vaccination to limit the spread of the disease.

Table 2 Overview of definitions: prevention costs versus outbreak costs

			Mainly affected by the costs (1)				
	Type of costs	**Examples**	**Govern ment**	**Livestock holders**	**Agrifood chain**	**Other industry sectors**	**Wider society**
Prevention costs	*Veterinary system*	▪ Surveillance (including diagnostic capacity/laboratories) ▪ Veterinary border inspection / customs ▪ Human resources ▪ Training and simulation exercises	**X** (public VS)	**X** (private VS)			
	Preventive vaccination	▪ Vaccine stocks / storage (cold chain) ▪ Human resources	**X**	**X**			
	Bio-security measures	▪ Animal identification ▪ Isolation of newly arrived animals ▪ Isolation of sick animals ▪ Movement rules (animals, people, equipment) ▪ Cleaning/disinfection procedures		**X**	**X**		

			Mainly affected by the costs (1)				
	Type of costs	**Examples**	**Govern ment**	**Livestock holders**	**Agrifood chain**	**Other industry sectors**	**Wider society**
A. Outbreak costs: direct impact	*Direct disease losses and control costs*	▪ Value of culled animals (including pre-emptive and welfare slaughter) ▪ Culling ▪ Disposal ▪ Cleansing and disinfection etc. ▪ Veterinary inputs ▪ Administration of control measures ▪ Serology ▪ (Ring) vaccination / buffer zone	**X** (2)	**X** (2)			
	Other direct production losses of directly caused by veterinary restrictions	▪ Business interruption losses directly caused by veterinary movement restrictions ▪ Partial loss of animal value (e.g. through vaccination etc.)		**X**			

			Mainly affected by the costs (1)				
	Type of costs	**Examples**	**Govern ment**	**Livestock holders**	**Agrifood chain**	**Other industry sectors**	**Wider society**
B. Outbreak costs: indirect impact	*Losses caused by* *ripple effects* *(impact on prices and on upstream and downstream activities)*	▪ Price effects regarding livestock/ livestock products ▪ Loss of access/ opportunity to access, regional and international markets ▪ Impact on inputs (feed, chicks, vet medicines)	**X** (3)	**X**	**X**		
	Losses caused by *spill-over effects* *(impact on other economic sectors)*	▪ Drop in demand in the services sector (tourism, public transport, retail trade, hospitality and food services)				**X**	

Notes:

(1) This Table refers to the economic agents *mainly* affected by the costs/losses
(2) Includes transfer costs of government for public compensation for culled animals etc.
(3) In terms of loss in fees / taxes

A more precise definition of the various costs is provided below.

3.6. Definition of outbreak costs

Outbreak costs differentiate between direct costs and losses, and the various indirect costs and indirect losses, in accordance with the typology of costs presented in **Table 2**.

A. Direct impact

The total direct cost of a disease is the sum of the production losses (direct and consequential) and the costs of disease control, as follows:

- **Direct losses:** Direct losses can stem either from the disease itself (which at its worst potentially result in the complete loss of all livestock of a particular species), or from sanitary control measures (stamping-out policies) (A292). In addition to the loss from the value of animals culled as such, there are culling and disposal costs.

- **Control costs:** Control costs during and after the outbreak typically include equipment, facilities, disinfectants, protective clothing, staff in quarantine stations etc. They may also include (ring) vaccination where this is considered appropriate and is available (more comment on vaccination can be found in section 3.4.3).

- **Other direct production losses**: Consequential on-farm losses include losses due to the fall in stock, to restrictions of movement when zoning restrictions are put in place, and due to the loss in animal value.

B. Indirect impact

The indirect impact of livestock diseases includes ripple effects, spill-over effects and costs to the wider society including longer term macro-economic effects. These costs are defined as follows:

- **Ripple effects:** Ripple effects include impacts on livestock and livestock product prices and on upstream and downstream activities along the livestock value chain. For example, the value chain for poultry is complex and involves several activities upstream and downstream: breeding, feed production, input supply (notably feed, breeding chicks, veterinary medicines), production, collection and trade (of eggs or live birds), slaughter, processing, final sale and consumption. Moreover, with globalisation markets have become increasingly interlinked, so that it becomes increasingly difficult to isolate the impact of an animal disease on a specific country or group of countries.

  Due to the methodological difficulties and constraints of this type of analysis and its extensive data requirements, such costs are rarely explored in depth in the available literature. The only costs that are more systematically covered by literature are the business disruption costs suffered by the poultry farmers and the poultry/egg production industry in terms of the fall in domestic demand and prices and the loss of export markets, and to a lesser extent the impact on the feed industry.

- **Spill-over effects:** Apart from agriculture as such and the impact of diseases along the affected livestock sector’s value chain, tourism and services are the two other sectors most severely affected. The macro-economic impact can consequently be severe if these two sectors are important in the economy. In addition, as already indicated, animal diseases can have major effects on food availability and quality for poor communities and therefore raise issues of food security, as well as having negative effects on poverty alleviation.

- **Wider society:** Developing or transition countries, which tend to have inadequate/inefficient public health systems, are particularly exposed to the risk of zoonoses on public health. In the particular case of a pandemic, a large proportion of the economic losses are caused by higher morbidity and mortality rates in the human population and by its repercussions on the world economy (A185).

3.7. Definition of benefits of improved prevention and control systems

Investing in measures to improve the prevention and control of animal diseases is costly, and the priorities for each country need to be established on a case by case basis depending on their current status, capacity and level of development[32]. This necessitates cost-benefit analysis, preferably in advance of the measures/programmes. This type of analysis is cumbersome (both in the applied methodology and in data requirements), and results depend highly on the assumptions made, as will be discussed in sections 4 and 4.4 respectively.

Three main benefits of improved prevention are most widely explored in the available literature. These are as follows:

4. **enhanced food security / poverty alleviation.** This includes the benefits accrued from productivity improvements and generally improved production systems.

5. **improved market access**

6. **savings in potential outbreak costs**

In terms of the first objective, it is important to note that an estimated 600 million poor people worldwide rely directly on livestock production for their livelihoods. Several parts of the developing world, most notably sub-Saharan Africa, are still below the recommended protein diet levels and only get a fraction of the daily livestock protein intake of industrialised countries[33]. In addition, each year the population of developing countries grows by an estimated 72 million, with the highest growth rates in Africa and in Asia, adding to the demand for food products[34]. Average annual per capita consumption of all meats in the developed world is thus projected to increase to 30 kgs, which represents an increase by about a third on 1993 levels[35] (A96). Improved animal health not only guarantees food supplies but is also considered to be a major factor for productivity gains in the livestock sector.

In terms of the second objective, trade in livestock and livestock products makes up approximately one sixth of global agricultural trade. Most of these exports (nearly 80%) currently come from the developed world (**Figure 1**). For example, the least developed countries are estimated to account for only less than 5% of total world meat exports by value. Within this overall picture only a few countries account for the bulk of exports: 90 % of exports of beef and poultry (70% for pork) come from 5 countries.

The only OIE developing/transition countries with a substantial export presence in the world today are Brazil and Thailand. Three countries account for 26.3% of trade in chicken meat (by value): Brazil 17.3%, Thailand with 4.7% and China with 4.3% (including Hong Kong then China accounts for 8.5% of trade).

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[32] This approach is generally advocated in the area of food safety, see for example A134.

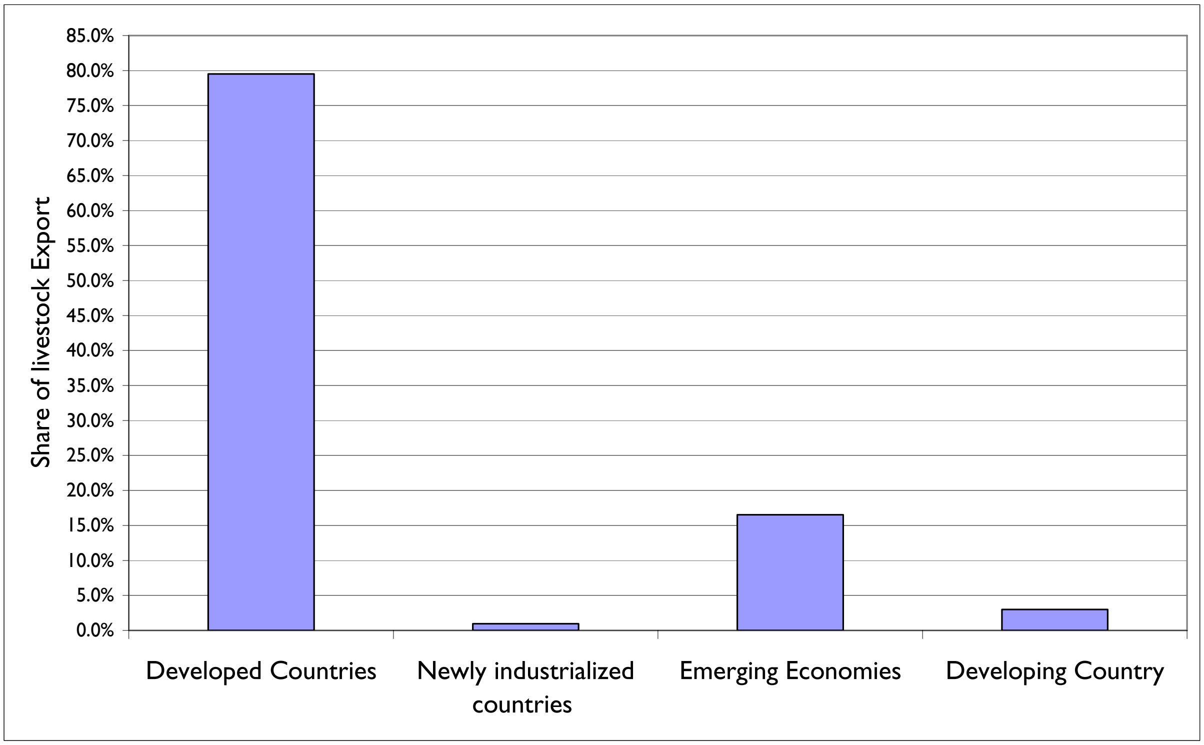
[33] Average daily per capita livestock protein intake in Sub-Saharan Africa in 2002 was 9.3 grams (representing actually a drop on 1980 levels), compared to 16.2 grams in developing Asia (an increase of 131% on 1980 levels), 34.1 in Latin America (24% increase from 1980), and 56.1 grams in industrialised countries.

[34] Source: world Bank, based on growth rates during 1991-2001. The highest growth rate is in sub-Saharan Africa (2.8%), followed by rest of Africa (2.6%), South Asia (2.1%) and Latin America/Caribbean (2.0%).

[35] IFPRI projections on the basis of a global food model (IMPACT).

Two emerging economies account for 9.6% of trade in beef (by value): Brazil with 6.7% and Argentina with 2.9% (Uruguay, a developing country, accounts for 2.3% of trade). Finally, four developing or emerging economies countries account for 8.7% of trade in pigmeat (by value): Brazil with 3.8%, China with 2%, Hungary with 1.7% and Mexico with 1.4%.

Figure 1 Share of global livestock product exports by key world regions (by value)



Source: UN COMTRADE data

It is widely acknowledged in the available literature that big gains are possible for the developing countries from removal of sanitary barriers now that post URAA tariff barriers have been reduced (e.g. A141); these opportunities are likely to expand if tariff barriers are further reduced in the ongoing WTO and bilateral negotiations. Within this evolving policy outlook, the improvement in SPS conditions for developing country exporters or potential exporters has become an issue of utmost importance (as well as being an obligation under the WTO SPS Agreement).

Furthermore, benefits are expected to accrue in terms of the potential savings to be made in outbreak costs from the fact that with improved prevention and veterinary services such outbreaks can be avoided altogether or their frequency reduced or at the very least their costs can be minimised. However, it is important to note that currently the cost-benefit of any investment aiming to improve early detection/diagnosis would tend to be unreliable as at present there are no accurate epidemiological modelling studies in the developing world of the rate of disease spread with late diagnosis versus early diagnosis (see for e.g. A7). Similarly, there is limited data and information on certain suspected risk factors, such as breaches in cross-border activity, which would provide the economic rationale in terms of the benefits of increased border controls for example[36].

In cases where data is available some cost-benefit analysis of the adopted/envisaged prevention and control measures has been carried out (outlined in section 4.4). The available studies focus at either of the above 3 main types of benefits or a combination. It is noted that estimating the potential benefit in export gains of improved export focused measures (such as establishing disease-free zones; developing laboratory capacity; regulation and training; strengthening capacity for slaughterhouse inspection and certification on exports, vaccination programmes) is a relatively more straightforward task. This analysis, however, is considerably more difficult and scarce in the case of sanitary measures that are aimed to improve domestic conditions and public health.

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[36] Such analysis is difficult to perform even in the context of developed countries where data availability is usually higher. See for example, EFSA report on the risk of introduction of FMD in the European Union.

4. Literature review: synthesis of main findings

4.1. The economics of animal health: state of the art

To date, the economic dimension of animal health has been relatively under-explored within the analytical framework of production economics. The reasons why this has been the case have been extensively covered by literature (see, for example A17 and A115) and include:

- The complex impact of animal diseases: while direct impacts are more straightforward to quantify, the more subtle implications of these diseases (indirect impacts, spill-over and ripple effects) have been more difficult to approach.
- The complexity of livestock systems compared to crop systems, due *inter alia* to longer cycles (generally over a year full cycle compared to most annual crop systems).
- The fact that many livestock systems are an integral component of mixed farm systems, particularly in developing countries. This often constrains analysis to examining impacts at farm or household level only.

The economic impact assessment of animal diseases and disease control is generally carried out at two levels:

1. The micro-economic level of the herd or farm household;
2. The macro-economic levels of the sector, the country or internationally.

Our review has focused mostly on the macro-economic analysis (A17, A28, A68, A81, A82, A232).

A range of tools and methods are available under this heading, including economic surplus methods, mathematical programming, and simulation and systems analysis. The over-arching framework which all these methods and tools appear to feed into is an analysis of costs and benefits (although not always in the strict sense of a cost-benefit analysis, or CBA, as applied in project appraisal as such[37]). It is argued that, if the subject of the analysis is long-term disease control programmes at the national or regional levels, CBA is the analytical structure of choice[38]. CBA is typically carried out to evaluate and compare between different strategies to inform policy-makers. It is used mostly to evaluate disease control programmes for a particular disease in a particular country or region within a country.

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[37] It is not possible here to provide a full description of the techniques of Cost Benefit Analysis (CBA). The reader is referred to suitable texts such as those by Gittinger (1982), Irwin (1978), and Dasgupta and Pearce (1978). Gittinger J.P. (1982). Economic Analysis of Agricultural Projects. Baltimore: John Hopkins University Press. Irwin, G. (1978). Modern Cost-Benefit methods. Basingstoke, UK: Macmillan Publishers Ltd. Dasgupta and Pearce (1978): Cost-benefit analysis: theory and practice. Macmillan, London.

[38] See for example, Dijkhuizen, Huirne and Jalvingh (1995): Economic analysis of animal diseases and their control. Prev. Vet. Med., 25, 135-149.

The various tools available for economic impact assessment differ greatly in complexity and in terms of the analytical skills required for their application, but are all limited by the requirements for appropriate data. Thus, generally, CBA in the AH field has been applied flexibly rather than in the strict project appraisal context. This is dictated largely by data limitations, as some of the costs and benefits are extremely difficult and contentious to quantify.

To overcome these constraints, CBA in the context of animal health strategies has often been based on relatively straight forward computation of key parameters such as the systems affected by the disease, livestock population at risk, disease incidence and possible control measures, leading to estimates of financial costs and losses and/or prevention/control costs[39]. Also, often the comparisons refer to different time periods for the respective costs and benefits, but due to the methodological difficulties a calculation of Net Present Values (NPVs) is not always undertaken. Although not as rigorous or comprehensive and despite these shortcomings, the advantages of this framework are that it can be applied and understood relatively easily (A115).

4.2. Costs of prevention and control systems

The sections that follow present data and key findings from a number of sources, including academic literature, project information, and national, regional and international programmes. With reference to the latter, the purpose has not been to address operational aspects or to evaluate the performance and positive/negative experiences of past investment, although where relevant a more critical assessment has been made.

4.2.1. The relevance of country preparedness to prevention and control costs

As already indicated, the costs of prevention will *inter alia* depend on the current state of the VS and preparedness levels in each country. For example, the most common key constraints to HPAI control and prevention, as identified by international organisations and experts[40] in the reviewed literature, include the following:

- Weak national veterinary services (VS);
- Poor surveillance;
- Lack of appropriate legislation in place in some cases;

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[39] An example of such a type of study (also involving simulation analysis under different scenarios) is A4

[40] Including the FAO, the OIE, the WB, AU-IBAR, Alive etc.

- Difficulties in implementing stamping out, vaccination, and movement restrictions, due either to inherent difficulties in the application of these control measure and/or to the inability of the VS to apply correctly;

- Disincentives for reporting the disease (in particular where compensation for culling has not been applied or has been applied incorrectly);

- Issues relating to lack of biosecurity.

An overview of the current status quo around the world for key components of an effective prevention policy (as discussed in section 3.4.3) is presented below.

It is noted that the OIE is currently in the process of assessing the level of preparedness and compliance with international standards of Veterinary Services in individual OIE Member Countries using the PVS tool. This work has started relatively recently, and the information that has emerged so far is in draft form and remains confidential. As more country analyses and information emerge from this process, the international community will be in a better position to assess the state of key components of prevention and control systems in countries around the world.

4.2.1.1. Emergency preparedness

A survey of OIE Member Countries around the world carried out in 2004/05[41] indicated that the main weaknesses in the chain of controls concern the logistical and financial resources of Veterinary Services, and insufficient involvement of livestock producers and even of field veterinarians. Furthermore, 25% of the African countries that responded to the survey have no program for control of transboundary animal diseases despite the high incidence of zoonotic and non-zoonotic epizootic diseases; this percentage is as high as 50% of the countries that responded from the Middle East[42] (A111e). It is important to note that only around 10% of these programmes/projects are targeted not at controlling one or more diseases but at improving overall animal health, by building the capacity of Veterinary Services. Against this, 65% of the countries perceive their capacity to comply with OIE standards on the quality of VS to be satisfactory on the whole[43]. Africa in particular suffers from a dire lack of capacities, as do Asia and the Americas to a lesser extent. An analysis of the survey results by country development level confirms that the developing countries have low capacities in all areas.

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[41] Survey based on a standard questionnaire sent to all OIE member countries in 2004 and 2005. The organisation and functioning of national Veterinary Services were analysed based on the responses from 85 of these countries.

[42] Percentages quoted are based on responses from the surveyed countries. In total 86 of the Member Countries of the OIE replied to the questionnaire (a 51% response rate), of which from Africa 20, Asia 21, the Americas 13, Europe 28 and Oceania 4. The low response rate of the Middle East may explain here why they appear to be worse-off than Africa.

[43] This question of the survey covered the following capacities of VS: staffing levels; training level; regulatory framework; budgetary resources; laboratory facilities; epidemiological surveillance; early detection/rapid response; risk analysis; information management; communication; collaboration between VS and public health services; participation in setting international standards; involvement of farmer organisations.; involvement of trade organisations; and the role of consumers.

To cope with the current disease situation, programmes and projects for the prevention and control of avian influenza have mushroomed since 2004, particularly in Asia and Europe, and more recently in Africa. According to another survey of some 200 countries[44] around the world carried out in 2006 by the UN System Influenza Coordinator (UNSIC), the majority of countries have made significant progress in the last two years in establishing Avian Influenza Task Forces and in developing integrated avian and human influenza preparedness plans[45] (A236).

Despite continuing progress and the strong engagement of national governments, a number of shortfalls remain. Some 55% of these plans have been endorsed by governments, while 45% are still in drafting process (**Figure 2**). Also, plans remain largely untested. The percentage of national plans tested through simulation exercises is particularly low in Africa (20%) and the Americas (29%), followed by the Middle East/N. Africa (40%), Asia/Pacific (48%), and Europe/Central Asia (58%)[46].

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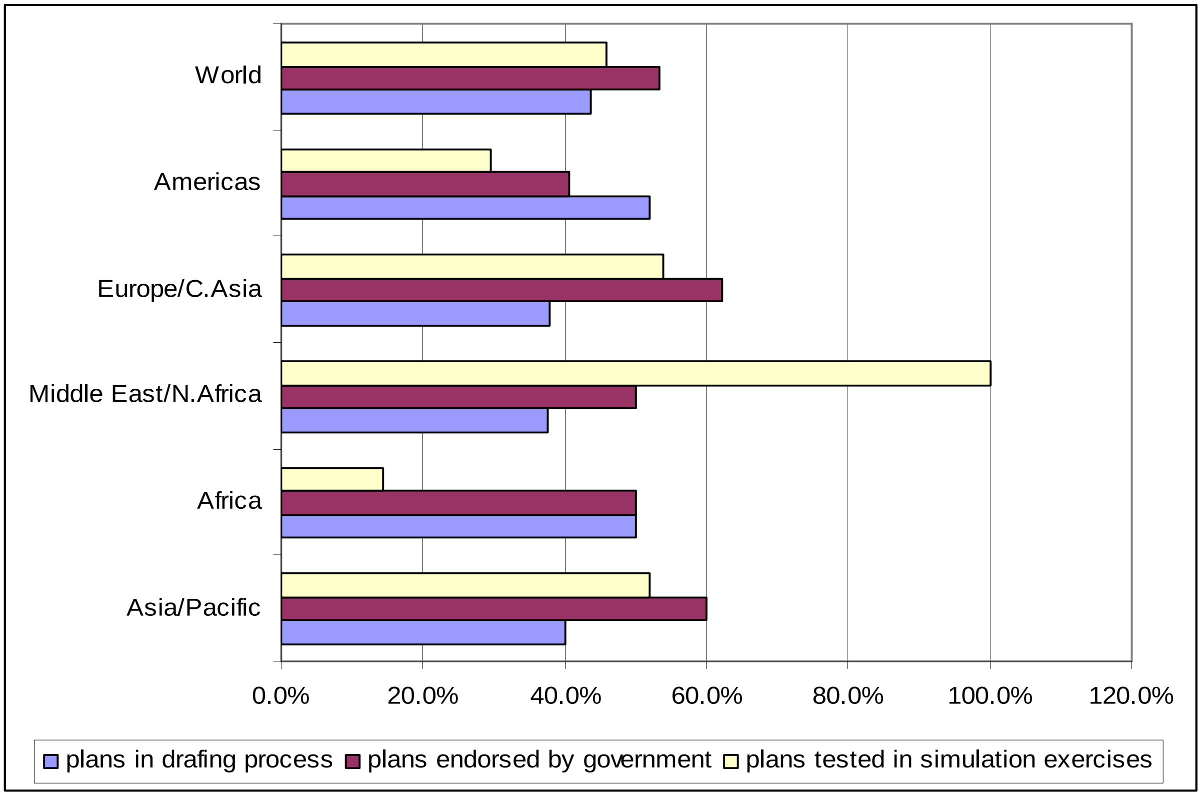
[44] The countries covered by the UNSIC survey include all developing/transition countries that are members of the OIE, i.e. all the countries covered by our analysis.

[45] The UNSIC baseline survey was carried out in May 2006 with results reported in June. The objective is to update on progress every 6 months. Thus, a first update on this was prepared in November 2006 (in draft, latest update available). Systematic comparison with the evidence obtained in June already indicates progress in a number of respects. Globally, in the animal health sector, there have been some significant enhancements in avian influenza detection capacity, surveillance and reporting systems, trans-boundary disease controls, poultry vaccination policies, and poultry compensation arrangements. It should be noted, however, that a smaller number of countries responded to the November update than to the May baseline. Therefore, the data quoted here use mainly the results of the baseline survey when the response rate was higher.

[46] The UNSIC survey covers simulation exercises for integrated preparedness, i.e. no distinction is made between the animal disease outbreak part and the human pandemic part of the plan.

Figure 2 Overview of country national emergency plans for HPAI (a)



(a) On the basis of the number of countries that responded to the survey (133 countries)

Source: UN System Influenza Coordinator, June 2006

Another key point is that although plans tend to focus on common key intervention areas (such as pursuing animal health through improved bio-security and veterinary services and integrating the animal health and human health approaches[47]), there appears to be significant variation in the contents and quality of the plans. This observation has been made by the 2006 UNSIC survey and was confirmed by our analysis of the national plans (discussed in section 4.2.3). Although the World Bank, the EC and the OIE endeavour to carry out uniform, independent expert assessments or appraisals of the quality of these plans, as far as we are aware these are not publicly available on a systematic basis to allow an informed comment on this in the context of the current analysis.

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[47] The WB inter-regional knowledge sharing seminar on avian and human influenza of July 2006 focused on the integrated country plans as the basis for coordinated and effective national response to avian and human pandemic influenza (AHI) and on the need for close linkages between health and agriculture services to facilitate the integration of national planning. Organised under the Global Development Learning Network (GDLN), a global partnership of more than 100 Distance Learning Centres.

4.2.1.2. Human resources

The availability of competent and well-trained human resources is an important dimension of the countries' preparedness to deal with animal diseases. Adequate expertise is essential to disease prevention and control. According to the 2006 UNSIC survey (A236), the number of trained veterinarians derived from existing official sources (as reported to the OIE Handistatus II database) varies considerably across all countries in the various world regions, and disparities between country/regions remain even after allowing for the size of the sector (in terms of the quantity of meat produced) per region/country (**Figure 3**).

These data and disparities between regions should be interpreted with caution. Firstly, there are significant limitations in the data available on veterinary expertise. Secondly, it is difficult to make an objective comparison of the different veterinary personnel situations in different countries because veterinary systems and livestock structures / production systems (whether intensive or extensive, backyard or industrial etc.) vary enormously between countries and these factors influence the optimal number of required veterinary staff in each case (A80, A81, A92)[48].

Generally, however, there should be some proportionality between the size of the sector and the number of veterinarians[49]. In practice, this does not seem to be the case (**Figure 3)**. For example, in the Americas, the number of veterinarians per country in relation to the size of the sector (expressed in 100,000 tonnes of meat produced) is 30-35% higher than in Europe, Asia and the Pacific (data for Europe include C. Asia), over double than in Middle East and North Africa, and 12 times higher than in Africa.

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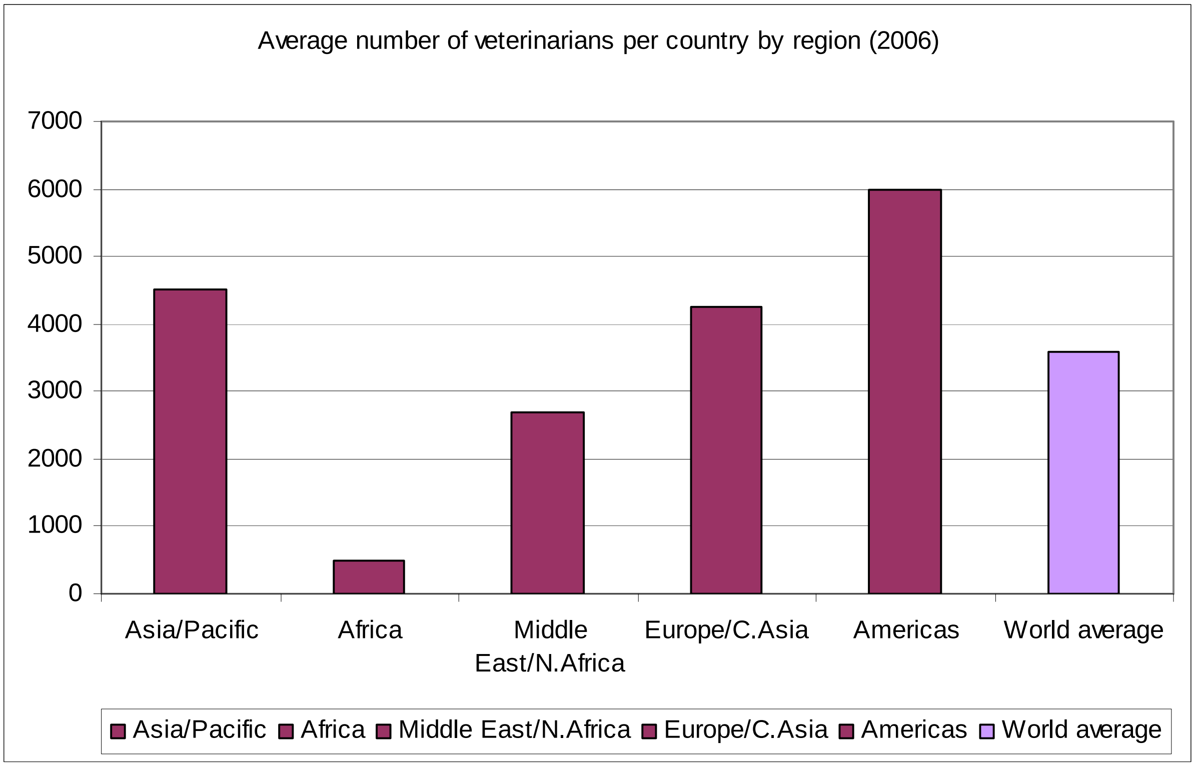
[48] There does not appear to be an optimal number of veterinarians as such. Every country has different veterinary personnel conditions and needs, is at a different stage of development in its Veterinary Services, and employs a different structure of veterinary staff categories (often mutually overlapping). Therefore, the impracticability of setting a fixed and uniform international quantitative standard for Veterinary Services is recognised (A80).

[49] Literature from the early 1990s (A81), quotes 20,000 Veterinary Livestock Units (VLUs) per veterinarian as the appropriate ratio for curative and preventative work in the extensive and low-input livestock production systems in Africa and the Middle East, compared to 2,500 VLUs in the high density and capital intensive production systems found in Europe. For regions characterised by a combination of extensive and intensive production systems (North and South America, Asia, Oceania) the average of the two above figures (i.e. 12,500 VLUs) is taken as a standard. An analysis of 1989 data shows that the Middle east at the time has a surplus of veterinary personnel, while Africa had a substantial deficit in veterinarians but a surplus in veterinary auxiliaries. (VLU: equivalent to 1 cow or 2 pigs or 10 small ruminants or 100 fowl).

Figure 3 Availability of veterinarians per region



Source: UNSIC 2006, based on FAOSTAT and OIE Handistatus II data for 2004

It is not just the number of veterinarians per se that is important, but also their **training**. From the results of the UNSIC survey, the number of veterinarians specifically trained in AI detection is unclear but it seems that significant gaps exist. Also, few countries[50] appear to have any village veterinary workers, and those which do generally have already been affected by AI. A survey conducted in 2003 to assess the current undergraduate curricula[51] in the veterinary faculties of sub-Saharan Africa demonstrated that most of these faculties faced serious shortages, both in budgets and qualified personnel (A153).

Beyond the availability of sufficient, competent and well-trained resources, major gains in the efficiency of human resources can be achieved by eliminating the overlap of functions between the public and private sector, through better organisation, streamlining of operations and a clear chain of command.

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[50] Only 17 amongst the countries that responded to the survey.

[51] The survey examined the extent to which such curricula are adjusted for crucial developments in the veterinary field and the increasing risk of transboundary diseases.

4.2.1.3. Animal disease surveillance systems

Building and maintaining good (epidemio-)surveillance networks covering the entire national territory potentially for all animals and for all animal diseases, including zoonoses, is an international obligation of all OIE member countries (**Table 1**).

Nonetheless, as demonstrated by the large animal health crises of the last decade including those related to FMD and HPAI, many countries especially in the developing world fall short of meeting this requirement. This is due to the lack of significant human resources, as well as of the necessary technical and financial resources that accompany both the initial investment and its operational maintenance.

The 2006 UNSIC survey (A236) provides a global perspective of the overall surveillance capacity for animal health. This indicates that overall capacity is perceived to be strong with nearly 84% of the surveyed countries reporting a strengthened AI surveillance and reporting in birds. Surveillance capacity appears to be equally strong across all regions.

Delays in reporting the outbreak of a disease to the OIE, the official body for mandatory reporting of listed animal diseases, can be an indicator of a country's preparedness to manage outbreaks (A236). A recent FAO investigation of reporting times for outbreaks of AI in animals, which covered some 2298 disease outbreak events from 31 countries since 2003, concluded that the average time from outbreak observation to reporting to the OIE was 12.7 days with a median of 10.8 days (range: 1.2 – 44.5 days). The required reporting interval from observation of an outbreak to notification of the OIE is immediate or 24 hours. This disparity may well suggest that significant gaps continue to exist in country-level preparedness[52].

Looking in more detail at two major components of the animal disease surveillance system, border controls and diagnostic capacity, according to the 2006 UNSIC survey:

Border controls for AI are also fairly strong, with 80-90% of countries across all regions planning or implementing such controls. It should be noted, however, that limited information is available on border control breaches (fraud/illegal imports) which makes it impossible to define the current level of risk from cross-border activity.

By contrast, **laboratory capacity** for AI detection is apparently in place for only some 65% of the countries that responded to the survey. Laboratory detection capacity is particularly low in Africa (reported in only 6 of the countries), the Middle East/N. Africa (7 countries) and the Americas (7 countries). Although the picture is better in the rest of the world it is still fairly modest in comparison to the key importance of this component (Asia/Pacific: 11 countries; and Europe/C. Asia: 19 countries). From the survey results, it seems that around 148 laboratories in the world today have the capacity to detect AI.

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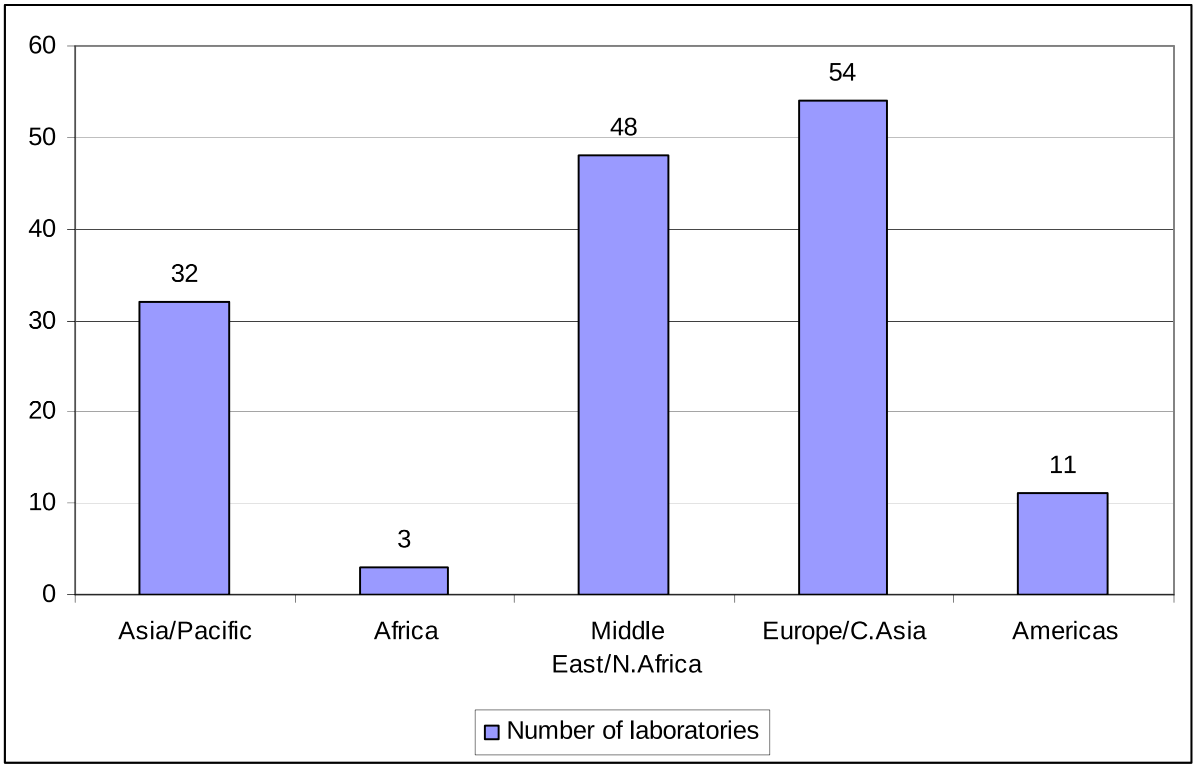
[52] This may not necessarily always be the case. Political pressures to under-report exerted by the industry and/or other interest groups can not be excluded.

Figure 4 Number of AI detection laboratories per region



Source: UNSIC survey, October 2006 (A236)

Furthermore, only 50% of the countries surveyed in Africa, Asia/Pacific and the Americas are planning or implementing **controls on cross-species contact of birds and other animals**, compared to around 80% in Europe/C. Asia and the Middle East/N. Africa.

According to the Alive partnership[53] as well as the PACE programme[54], capacities for disease reporting with epidemiological investigation and differential diagnostic follow-up actions as well as data analysis are generally deficient in Africa (A258 and A163). This is despite the significant progress made in developing national surveillance systems by programs aimed at controlling epizootic diseases (in particular PARC and PACE[55]) over the last 20 years, which have received sustained funding and technical support[56]. More recently, in January 2006, the FAO launched a series of Regional Technical Cooperation Projects in West/Central, East/Southern and North Africa, which are intended to establish HPAI disease and epidemiological surveillance networks.

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[53] ALIVE: Partnership for Livestock Development, Poverty Alleviation, and Sustainable Growth.

[54] The Pan African Programme for the Control of Epizootics (PACE) replaces the Pan African Rinderpest Campaign (PARC) which concluded in 1999. The main aim of PACE is a surveillance of epizootic diseases in Africa to accurately determine their prevalence and impact on livestock production. It is the first continental epidemiology programme. The five-year PACE programme covers 32 sub-Saharan countries, has a 72 million EURO budget, and is co-ordinated by the Inter-African Bureau of Animal Resources (IBAR) of the Organisation of African Unity (OAU).

4.2.1.4. Vaccination

Vaccination is another control and/or prevention measure applied in selected cases, where this is available and considered appropriate. At present, there is significant literature and policy debate on the suitability of this control method and the conditions that need to be fulfilled for its effective application. For example, vaccination for HPAI has been applied in Vietnam (apparently with successful results) but not other parts of Asia[57], and is currently being considered in Nigeria although there is a strong debate on its potential effectiveness in the Nigerian context (A293). In the countries where a vaccination strategy was adopted, this was mainly because the disease had spread widely throughout the smallholder poultry sector, particularly in production systems 2, 3 and 4 (medium to low level of biosecurity), accompanied by very high animal mortality (A40). The trade situation of a country and its concern to have its products accepted in export markets is another key parameter affecting decisions to adopt vaccination (e.g. Vietnam has no exports versus Thailand which is a key export country). The debate is compounded by the lack / limited access to data on the efficacy of this policy option and of the current vaccines used[58].

The 2006 UNSIC survey (A236) indicates that country attitudes and vaccination strategies differ substantially between regions and the implementation of such programmes remains relatively infrequent. The percentage of countries planning/implementing poultry vaccination is particularly low in the Americas (16%), Europe/C. Asia (23%), and the Middle East/N. Africa (28%), and relatively modest in the rest of the world (Africa: 52%; Asia/Pacific: 45%) Although in the last 6 months of 2006 countries stepped up their preparation of vaccination plans, it is unclear whether this was triggered by a growing acceptance of this policy option or simply reflects the response to the rapid spread of H5N1.

The OIE/FAO are currently in the process of developing guidelines on vaccination for HPAI, which cover *inter alia* the epidemiological situation of the disease, the type of poultry production systems, logistical factors (veterinary services, cold chain requirements), diagnostic capacity, the objective of the vaccination campaign (whether emergency, preventive or routine), the strategy (mass, targeted or ring), and monitoring and financial issues. A world conference on vaccination for avian influenza has taken place in March 2007[59]. The conference's recommendations state that "*vaccination plans should be an integral part of a country's contingency and emergency preparedness plans*", and that "*vaccination should be considered on the basis of a comprehensive analysis including risk assessment of the country situation and context*", "*when relevant as an additional tool to classical methods such as stamping out and increase of biosecurity, but always in combination with these classical methods*". Furthermore it is recommended "*that importing countries respect the OIE standards to avoid unjustified trade barriers related to vaccination against avian influenza*".

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[55] It was in fact the PACE surveillance programme that first alerted Africa to HPAI infection (in Nigeria).

[56] Despite the progress achieved by these programmes, new challenges have emerged in terms of prevention and control, such as those more recently posed by HPAI. Also, few donors have allocated funds so far to finance projects that would ensure the sustainable and long-term reinforcement of VS.

[57] Currently (Nov 2005), China, Vietnam, Indonesia and Pakistan are the only countries using vaccination as part of their HPAI control strategy.

[58] Modelling studies suggest that where 90% of birds in a flock are adequately protected by vaccine, the probability of flock infection is reduced by 50%. However, despite such vaccination protection at the individual level, ‘silent spread’ of H5N1 can still occur within the flock, with risk for transmission between flocks, particularly at the end of production cycle when biological security is compromised during bird transportation and cleaning of housing units. This highlights the need for a highly effective vaccine, an equally effective vaccination delivery mechanism, adequate bio-security measures, and potentially, the use of unvaccinated sentinel birds placed within vaccinated flocks (A236).

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Our analysis in this section leads us to the following conclusions:

Relevance of country preparedness to prevention and control costs:

The costs of improved prevention and control for the major TADs will depend *inter alia* on the current level of preparedness in the various countries.

Existing data from international surveys (OIE, UNSIC) and other literature suggest that there are considerable differences in approach and status quo between developing/transition countries, notably in terms of the overall state of Veterinary Services, preparation of prevention and control plans for specific diseases (e.g. HPAI), available and well-trained veterinary staff, epidemio-surveillance networks, border controls, diagnostic capacity, and vaccination.

In the context of countries' international obligations within the overall framework for the prevention and control of major TADs, as defined by the OIE, the varying levels of preparedness and prevention systems between countries indicate the need to define priorities and assess gaps on a country by country basis. In the case of vaccination the policy debate on the appropriateness and conditions for application of this method is currently on-going.

This has implications in terms of the budget required in each country to enable it to arrive to an optimal surveillance system.

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[59] Vaccination: a tool for the control of avian influenza. An OIE/FAO/IZSVe scientific conference co-organised and supported by the EC (http://www.oie.int/verone/index.htm).

4.2.2. Assessment of costs at international (global/regional) level

A number of international initiatives are in place today, whether global, regional or disease specific, which range from detailed programmes for the control of specific TADs (HPAI, FMD, rinderpest etc.), to more general international initiatives in the field of prevention and control of TADs, and activities dealing with the enforcement of SPS rules and standards. These provide assessments of the relevant costs, either at global/regional level, and/or at country level[60]. They include the following (listed in order of relevance to the study, moving from those that are disease specific to the more general)[61].

4.2.2.1. Disease specific programmes

a) Global fight against avian influenza

The global financing framework for the fight against avian influenza has been flexible and dependent on systematic monitoring of the prevailing and anticipated needs. Thus, a number of need assessments of the required budget have been prepared in the last 2 years by the various competent international organisations and presented to donors with requests for funding. These assessments include components that relate to the control of the disease in the short term and components that relate to the medium-long term objectives of improving prevention and the capacity of national VS to respond more effectively to outbreaks. Pledges have consequently been made for funding action at three levels: country responses which attract the bulk of the budget, and - given the need for countries to cooperate on cross-border issues - involvement of key regional organisations and global activities (WHO, OIE, FAO, and others).

The international stakeholders' meeting on Avian Influenza and Human Pandemic Influenza (AHI), which was held in Geneva in November 2005, concluded with a strong consensus on the need to address AHI by supporting integrated country programs, covering both animal health and human pandemic preparedness, complemented by regional and global coordination. As a result, a total US$ 1.87 billion was pledged in January 2006 at a donor pledging conference in Beijing, including both grants and loans/credit, of which a total US$ 1.4 billion had been committed as at 31 October 2006[62] (A147 and A282).

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[60] It is noted that where needs assessments are performed by the countries themselves, their demands may not necessarily reflect real needs. The data that are available in this context should always be used with caution. The OIE PVS evaluations can play an important role in this respect in providing an objective picture of the real situation, moreover as they follow a uniform approach between countries.

[61] This section does not aim to provide an exhaustive list of all the programmes in place today, but to highlight some of key relevance to this study.

[62] The largest international sources of support have been the World Bank (14%), the European Commission (13.2%) and the Asian Development Bank (5.6%). The largest country donors have been the United States (26.9%), Japan (13.3%) and Australia (7.9%), followed by several EU MS (Germany, UK, France, Netherlands, Sweden, Finland) which together account for 11.4%.

The pledge was based on a World Bank assessment of the financing needs and gaps at the time (A89 and A176)[63]. This included mainly country level support (accounting for US$ 1.2 billion), and relatively smaller shares to support the role of international organisations in assisting regional and global initiatives on animal health (US$ 75 million, for organisations including the WHO, FAO, and the OIE) and on human health (US$ 157.6 million for the WHO).

The activities foreseen included assistance to ‘infected’, ‘at risk’ and ‘newly infected’ countries for: emergency preparedness (development of functional disease control plans and simulation exercises; development of contingency plans for human pandemic of influenza of avian origin), active surveillance and monitoring, and communication and public awareness; laboratory support (including provision of equipment and consumables, assistance with diagnostic procedures), and assistance with analysis and studies (including of epidemiological data); and disease control (including provision of equipment, vaccines and consumables), capacity building, poultry industry restructuring, and various coordination activities.

When first presented at the Geneva stakeholders’ conference and to the Beijing donor pledging conference, the global programme for avian influenza control (developed jointly by the OIE, FAO and the World Bank), had estimated costs for the animal health component only to US$ 494.3 million over a period of 3 years (of which some US$ 60 million were sought for the first 6 months as emergency action).

Due to the rapid expansion of the disease, this budget was substantially revised in March 2006 to a total estimate of US$ 882.1 million over the 3-year period (FAO’s perspective for a global programme for avian influenza control and eradication A42). Of this, some US$ 308.5 million were proposed to serve as a contingency mechanism, to be managed by the FAO, for rapid response to infections in new countries not identified as yet (of which funds for 6 months only, at US$ 21.6 million, were sought at this stage). The important budget increase provided for the unexpected spread of the disease to Europe and Africa (two continents that were not affected in November 2005 when the previous estimates were made) but also in Asia itself. The budget included an international coordination component of US$ 132 million[64].

The emphasis was mainly on infected countries for which nearly a third of the total budget (some US$ 304.5 million) was proposed. Two countries (Indonesia and Vietnam) accounted for nearly a third of this total (US$ 75.3 million and US$ 20.4 million, or 25% and 7%, respectively), whereas India and Nigeria were estimated to need around US$ 45 million each (i.e. 15% each of the total)[65]. A further US$ 157.6 million was proposed for countries ‘at risk’ which included all world regions.

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[63] The Technical Note (Annex C) to document A89 (“AHI: Financing Needs and Gaps”) provides details of the costing for individual countries, the assumptions made and the tools used for extrapolation to the world. This procedure was undertaken in consultation with the OIE, the FAO and the WHO

[64] This was drafted on the basis of supporting coordination activities to be undertaken by the FAO as such and did not include activities related to the OIE notably coordination of the international effort for the strengthening of VS for mid to long-term capacity improvements, which was part of the original Geneva budget (for a proposed $22.5 million).

[65] The proposed budget for Indonesia, Vietnam, Lao and Cambodia was based on detailed need assessments in the countries, whereas for a second set of countries (15 countries, including India, Nigeria, Egypt, Iran, Cameroon, Romania, Turkey, Malaysia etc.) detailed need assessments were still to be provided.

In December 2006, at a major three-day international donor conference on avian flu in Bamako[66], the World Bank provided revised estimates of the global financing needs and gaps for combating avian flu during the 2006-08 period, with total needs for country-level support estimated at US$ 2.27 billion[67] (A147 and A282).

The revised estimates were justified as follows. Firstly, it was already evident that due to the high disbursement rates of the previous pledges (as of end of October 2006, some 75% of the Beijing pledges had been committed and 51% had been disbursed) grants were already exhausted and not available for programs going forward[68]. Secondly, the focus of the previous pledges had been mainly East Asia and East Europe with Africa receiving little support; consequently, the revised estimates placed an increased emphasis on support to newly infected countries in sub-Saharan Africa while maintaining the level of effort required for fighting the disease in SE Asia (**Table 3**). Thirdly, since the Beijing pledge, there had been a dramatic increase in the number of countries reporting infection (55 in total since January 2006), and in the number of human deaths (154 in total).

The World Bank estimated that, under two different scenarios, the financing gaps as in December 2006 were US$ 880 million to US$ 1.15 billion. As of today, it appears that following the Bamako donor conference, a further US$ 475 million has been pledged by international donors[69].

As part of the overall financing framework for avian influenza control, the World Bank proposed in December 2005 a $500 million multi-country facility (a horizontal APL) designed along the lines of a multi-country Adaptable Program Loan (MAP) for a global program for avian influenza control and human pandemic preparedness and response (A43). A total 30 projects have been approved to date under this programme for a total US$330 million. The total and individual detailed components under each project are summarised in **Annex 4**, and more details of the projects that are currently in progress in Nigeria and Romania are contained in the case studies on these countries (sections 5.3 and 5.4 respectively).

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[66] The objectives of the Bamako Conference were: (1) To take stock of international mobilisation within the framework of a world wide partnership in the fight against the avian influenza epizootic and the prevention of a global pandemic; (2) To provide the necessary technical elements and draw lessons from the initial experiences with a view to improving the global combat strategy; (3) To develop a specific advocacy strategy that targets African governments and the donor community for increased financial support to combat the disease on the continent. For more information see: www.avianinfluenzaconference4.org

[67] In addition, estimates were given of need to support UN agencies ($300 million for 1 year) and the OIE ($25 million for 1 year only).

[68] The only source of funding with substantial uncommitted amounts were the multilateral development banks (WB and ADB). As of end of October 2006, they had committed $281m to specific AHI programs, against Beijing pledges of $974m. **However, these uncommitted funds were mostly loans and concessional credits, rather than grants**. Disbursement rates of multilateral development banks were low because the country programs that they finance are multi-year (strengthening of animal and human health services and other capacity-building typically requires 3-5 year programs). To circumvent this problem, and facilitate speedy implementation, the World Bank applies its emergency lending procedures to avian flu projects under its Global Programme for Avian Influenza Control (GPAI/APLs) (A43).

[69] In addition to the $513 million committed as at end of October 2006.

The global financing framework for HPAI is summarised in **Table 3**. Of the estimated financial needs in the original estimates in January 2006, infected and newly infected countries account for the majority (60%). A relatively high amount was also estimated for countries at 'high risk' (38% of the total), which reflected the large number of countries falling in this category. In terms of geographical distribution of the country needs, a comparison of the January 2006 and December 2006 estimates reflects clearly the change in focus following the emergence of HPAI/H5N1 in Africa. In the original estimates of January 2006, East Asia accounted for over half of the total (52.8%), followed by Europe/Central Asia (18.7%), sub-Saharan Africa (12.2%), and Middle East/North Africa (9.15%). In the revised estimates of December 2006, East Asia maintained the largest share (41.1%), while the share of Sub-Saharan Africa increased substantially (25.9%). In fact, between the two estimates, the financing needs for Africa have increased fourfold, the needs for East Asia and South Asia increased by about 50%, and the needs of the Middle east/North Africa more than doubled. The largest need increases were for Egypt and Nigeria. Indonesia accounted for a large part of the increase in the financing gap in East Asia.

Given that the above framework covers the next 2-3 years (3 years from January 2006, 2 years from January 2007), it could be deducted that – as it currently stands - the global estimates of the required investment in improved prevention and control for an integrated (animal and human health) HPAI project, including country needs and regional needs, come to an **average US$ 860 million per year**.

Table 3 Prevention and control of HPAI: global financing framework and country needs

	Needs (a) (million US$)
WB: Financing needs and gaps, January 2006 (Beijing pledging conference)	
• Country needs (b), of which:	1,202.3
Infected countries	*565.9*
Newly infected	*150.5*
High risk	*461.1*
Low/moderate risk	*24.8*
TOTAL (c)	***1,809.7***
WB: Financing needs and gaps, December 2006 (Bamako pledging conference)	
• Country needs (b), of which:	2,273.9
Sub-Saharan Africa	*588.9*
East Asia & Pacific	*935.2*
Europe & Central Asia	*247.0*
Latin America & Caribbean	*21.0*
Middle East & North Africa	*233.0*
South Asia	*148.7*
TOTAL	***2,273.9***

(a) Estimates of needs for the next 2-3 years

(b) Excluding contingencies at 20%
(c) Including contingencies at 20%; including needs at regional level

Source: WB, January 2006 and November 2006 (A89 and A147)

According to the methodology underlying these estimates (A89), a significant proportion of identified needs in fact address rapid emergency containment in the event of an outbreak (including culling, compensation, control and vaccination costs). Projected at the latest WB estimates presented in Bamako (A147), this amounts to just under US$ 1 billion (**Table 4**). On the other hand, prevention and preparedness costs as such (i.e. including preparation of preparedness plans, coordination, surveillance and early warning, development of animal health strategies) accounts for 45% of the country needs, or just over US$ 1 billion. On a 3 year basis, this amounts to **an average US$ 340 million per year.** It is noted that this includes both the animal and the human health components of prevention and preparedness for AI.

Table 4 Prevention and control of HPAI: estimates of global needs by type of intervention

	In million US$ (a)	**Share of total (%)**
1. Cross cutting issues (preparedness plans and coordination) (b)	181.9	8%
2. Surveillance and early warning (animal and human)	636.7	28%
3. Rapid outbreak containment plan and operations (animal and human) (c)	977.8	43%
4. Health system response to deal with AI	27.3	12%
5. Preparing a medium-term agenda for animal and human health	204.7	9%
TOTAL (a)	***2,273.9***	***100%***

(a) Excluding contingencies at 20%. Source A89
(b) For which a standard package of technical assistance and studies of US$ 250,000 was taken as the baseline for an average size country, adjusted for country size.
(c) This includes culling and compensation costs, and vaccination costs.

Source: World Bank (A89 and A147)

The Africa estimates included in this framework were established in the context of the ALIVE project. A preliminary assessment of the financing needs and gaps for avian and human influenza control and prevention in Africa was made in June 2006 (Vienna meeting). This was revised in December 2006 for the Bamako conference (A 258). The global budget needs were estimated at US$ 722 million for immediate and short term needs for 3 years; and another US$ 1.1 billion for year 4-10 (**Table 5**). The animal health component as such accounted for over half of the estimated needs in each case.

The ALIVE needs assessment for Africa prepared a detailed breakdown of the various costs involved, including for the animal health component (as a total for the 54 countries covered by the assessment). Of the total national funding estimated to be required for the animal health component, prevention activities and the strengthening of VS as such accounted for only a fifth of the budget in the short term 3-year period (US$ 44.4 million and US$ 32 million, respectively) (**Table 5**). However, in the medium to long term period, these activities were estimated to amount to 66% of the total needs, largely because of the increased investment in strengthening VS (US$ 74.5 million and US$ 269.3 million, respectively). On the other hand, the bulk of the costs in the short term were taken by the estimated response needs, in view of the urgent upsurge of AI, but the relative share of these costs diminished in the medium-long term time frame (from 80% down to 34%).

Table 5 Prevention and control of HPAI: Africa needs estimates by type of intervention

			in '000 US$
	Immediate	**short term (3 years)**	**Medium & long term (4-10 years)**
Animal Health Component (national funding)			
1. Prevention			
Preparation of emergency preparedness plans	2,000	2,000	
Strengthening disease surveillance for early detection, diagnosis and reporting	700	19,000	42,000
Improving biosecurity		8,000	17,500
Training & continuing education of veterinary staff	2,000	5,000	15,000
Poultry census and mapping of farming systems		1,000	
Sub-total	*4,700*	*35,000*	*74,500*
2. *Response (a)*			
Sub-total	*9,550*	*252,500*	*178,200*
3. Strengthening VS			
Governance and legislation activities in line with international standards		520	480
Development of priority infrastructure		24,000	224,000
Strengthening the capabilities of public and private national actors		2,300	19,600
Support for the organisation of producers and processors		2,900	25,200
Sub-total		*31,970*	*269,280*
Total Animal Health (national funding)	***14,250***	***333,720***	***521,980***
Total Animal Health (regional funding)		***58,410***	***94,850***

	in '000 US$		
	Immediate	**short term (3 years)**	**Medium & long term (4-10 years)**
Total Animal Health (national & regional)	***14,250***	***392,130***	***616,830***
Global budget (b)	***22,603***	***722,055.5***	***1,095,598***
Total AH share of global budget (b)	***63.1%***	***54.3%***	***56.3%***

(a) This includes culling, compensation, and control costs (including vaccination).
(b) Global budget includes human health and communication activities

Source: ALIVE (A258)

b) South East Asia campaign for the control and eradication of FMD (SEAFMD)

In 1994 the OIE launched a campaign to control and eradicate FMD in Southeast Asia. For this purpose it established a sub-commission for FMD control in South-East Asia (SEAFMD)[70] and in 1997 established a Regional Coordination Unit for FMD in South-East Asia (RCU) in Bangkok to harmonise the control actions against FMD between the countries of the region (A 234). At that time in fact the Veterinary Services of the seven countries concerned were at different stages of development and most of them lacked veterinary staff with good training and adequate resources. The sub-commission developed a regional plan for FMD control as a guideline for control activities in the region (SEAFMD campaign). The RCU operated a regional coordination role by assisting countries to develop harmonised plans and to implement the FMD control measures in line with the SEAFMD campaign. The annual budget of the Regional Coordinating Unit (RCU) is estimated at US$ 600,000 per year to operate the coordinating and monitoring agency and to supply the necessary skills, training and information throughout the campaign.

The project was developed in three phases. The first phase (1997-2000) (*Preparatory Phase*) focused on the reinforcement of the animal health services in the countries concerned and in achieving uniformity in the disease control activities to reach a minimum standard before starting phase 2 of the program. The second phase (2001-2004) (*Control Phase*) was focuses on extensive epidemiological monitoring, strategic vaccination, animal movement control and step-by-step creation of disease free areas. The third phase (2006-2008) (*Eradication and Consolidation Phase*) has the objective to establish a well protected and internationally verified FMD free zone within the region (13th meeting of the OIE SEAFMD Sub-Commission for FMD in Southeast Asia, Cambodia, March 2007).

All these activities have involved collaboration with the FAO and the joint FAO/IAEA division, the International Livestock Research Institute, the World Reference Laboratory for FMD (Pirbright, UK), and agencies such as ACIAR. National donors from countries in the region have also significantly contributed to the campaign.

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[70] Initially SEAFMD involved seven member countries of the ASEAN (Association of Southeast Asian Nations) countries with endemic FMD. They were: Cambodia, Laos, Malaysia, Myanmar, the Philippines, Thailand and Vietnam. Indonesia joined the Sub-Commission in 2000 (A181).

Only two countries of the region at the start of the campaign, namely Myanmar and Thailand, had a capacity to produce vaccines. Due to the high budgets required for the purchase and application of massive vaccination, vaccination has only been used to protect high-risk enterprises, to undertake strategic vaccination and to control outbreaks at a local level (ring vaccination). (Regional Coordination, OIE SEAFMD programme).

This campaign was successful in the Philippines where two thirds of the country have achieved the FMD free zone status and in Indonesia which is free of FMD. In 2003, a new step in the SEAFMD strategic plan started through the Malaysia-Thailand-Myanmar (MTM) Peninsular Campaign for FMD Freedom. The MTM Campaign involves Malaysia, Thailand and Myanmar, and aims to establish a FMD free zone on the MTM peninsular according to the OIE standards.

In 2003, the Asian Development Bank (ADB) presented a regional programme aiming to achieve an FMD-free zone in the Greater Mekong region over a 6-year timeframe, with a proposed budget of US$ 5 million over the 2003-07 period.

c) Pan American campaign for the control and eradication of FMD (PANAFTOSA)

To fight against FMD in the Americas, the Pan American Foot and Mouth Disease Centre (PANAFTOSA) was created in 1951 in Rio de Janeiro as a special program within the Organisation of American States (OAS), and later transferred as a specialised centre of the PAHO (WHO). The centre was created to improve the control and eradication of FMD through research on new vaccines and diagnostic procedures, and trained government and private sector workers throughout the Americas to set up strategies for the control and eradication of FMD. (A191)

The Centre developed reference techniques for virological and serological diagnosis for FMD as well as for vaccines and in 1973 developed the Continental System for Information and Surveillance of Vesicular Diseases, to collect epidemiological information in all countries of South America.

In 1987 PANAFTOSA under the guidance of the Hemispheric Committee for the Eradication of Foot and Mouth Disease (COHEFA) developed the Hemispheric Program for FMD eradication (PHEFA) as a regional programme to be foreseen by the single countries.

The objectives of the PHEFA were to eradicate FMD of the America by 2009 through the control and elimination of the disease in endemic areas and the prevention of reintroduction of the disease in free areas.

Based on the knowledge of the production forms, the identification and evaluation of the risks of introduction of FMD in different areas according to a macro regionalisation of South America in endemic and free areas, the programme set up the guidelines for national programmes for the control and eradication of FMD. The main principles of the program include: epidemiological surveillance; prevention system; sanitary control at airports, ports and borders; laboratory diagnosis and vaccine control; vaccine production; massive and systematic vaccination; control of outbreaks; information systems; border controls; and community participation (Source PANAFTOSA- PAHO/WHO).

These principles were adopted at national level by each country, and the outbreaks were largely successfully controlled through massive vaccination or stamping out according to their own national control and eradication policies for FMD, quarantine measures and control of movement at border areas and between areas with different FMD health status.

In consequence of new outbreaks in 2001 which affected Argentina as well as Uruguay, and parts of southern Brazil (A191) on March 2004 GEIFA (Inter-American group for FMD eradication) was created as the competent body for the preparation, supervision and execution of the regional project for the final phase of the eradication of FMD in the Americas, as part of the PHEFA and in support of the national programmes for FMD prevention and eradication. GIEFA developed an Action Plan for 2005-2010. The Basic Strategies of PHEFA and GIEFA are the knowledge of livestock production forms; the characterisation of risk of introduction and diffusion of FMD; strengthening of National Veterinary Services; improvement of coordination between National services on a regional basis; stimulate livestock sector participation in programmes; allocation of international resources for the poor or in need areas.

In the wake of the FMD outbreaks which occurred in 2001, especially in Europe and South America, the OIE and FAO convened an international conference on FMD in Brazilia, Brazil. One of the key recommendations was a call for international action against major animal diseases, especially FMD, rinderpest and classical swine fever. This was further emphasised by the special ministerial meeting on FMD during the 31st Session of the FAO Conference, which urged the FAO, OIE and World Health Organisation (WHO) to continue their joint efforts to seek an international solution to the problem of FMD and other transboundary animal diseases.

The FMD campaign has attracted significant funds over the years. During the 1990-2004 period, some US$ 3.5 billion have been committed to the fight against FMD by South American countries, and these efforts are continuing. While a regional approach is increasingly being advocated to addressing FMD, the extent of the financial commitment on GIEFA is not clear as yet. A review of the cost-benefit of improvements in Latin American veterinarian systems was recently undertaken by the OIE Regional Representation/CEMA (A141) [71]. These issues are explored further under the Argentina case study (section 5.1).

d) Pan-African Programme for the Control of Epizootics (PACE)

PACE is a five years (2002-2007) regional programme coordinated by the African Union Inter-African Bureau of Animal Resources (AU-IBAR) with the aim to improve surveillance of epizootic diseases in Africa to accurately determine their prevalence and impact on livestock production. 32 Sub Saharan African countries were involved in the project, which has represented the first continental epidemiology programme. PACE has been funded by the European Union through the European Development Fund and its total cost **over the 5 year period has been estimated at 72 million EURO**.

The programme is a successor to the Pan African Rinderpest Control Programme (PARC) in force from 1986 until 1999, which virtually eradicated Rinderpest in Africa. PARC has been a key element of the Global Plan for the Eradication of Rinderpest (GREP), a programme coordinated by FAO that aims at the eradication of the disease from the world by 2010. (Source: FAO EMPRESS)

According to an assessment made by the Epidemiological Unit of PACE, CBPP is endemic in many parts of Africa and it is identified as the second most important transboundary disease in Africa after rinderpest. The reasons for the persistence of CBPP are attributed to animal movement within and between countries and to the absence of adequate diagnostic tests, the lack of use of diagnostic tests because of diminished financial support and a downturn in the use and quality of CBPP vaccine.

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[71] This research is currently in progress – results are preliminary. Further findings are presented in **Table 10**.

Animal losses in Africa due to this disease are estimated to be about US$ 2 billion. Several projects have been undertaken from 1990-2003 to assist the member countries in the control of CBPP through FAO TCP[72] for a total amount of US$ 3,322,633. (Source Towards sustainable CBPP control programmes for Africa, FAO, 2004).

4.2.2.2. General programmes

a) Standards and Trade Development Facility (STDF)

The STDF was formally established in mid-2002 by the FAO, the OIE, the World Bank, the WHO and the WTO, as a financing and coordinating mechanism. The World Bank estimates that annual expenditure by donor agencies on trade-related SPS programmes has been running at an **annual budget of US$ 65-70 million** (although some under-reporting of technical cooperation activities is possible). However, based on data from the STDF database, it would appear that only a small minority of the projects reported deal with the strengthening of hard infrastructure such as laboratory facilities (the bulk dealing with knowledge transfer projects) and that in terms of the overall number and value of projects, animal health lags behind the food safety sector and other SPS issues[73] (A111f).

b) Global framework for the progressive control of transboundary animal diseases (GF-TADs)

This joint initiative was developed by the FAO and the OIE in May 2004, to serve as a facilitating mechanism to provide for capacity building and to assist in establishing programmes for the specific control of certain TADs based on regional priorities. The six-year programme (2004-2009) envisages *inter alia* supporting country-based surveillance and enhanced disease reporting through capacity building of epidemiology units and of laboratory personnel; concerted animal disease control programmes developed through the establishment of regional support units within ongoing regional specialised organisations and/or Regional Commissions; and, the development of Regional and Global Early Warning Systems for TADs (GLEWS) established with the collaboration of FAO, OIE and WHO, connected to regional epidemiological systems.

One of the main objective of GF-TADs has been the design of national programmes on disease control, which would be prepared with national authorities and submitted by the GF-TADs Steering Committee to donors.

The entire programme foresees a budget of **US $79.4 million for the six-year period**[74].

c) OIE plan to support the VS of developing countries to meet OIE international quality standards

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[72] FAO Technical Cooperation Programme (TCP)

[73] For example, in 2005 some US$ 1 million was spent on animal health and feed quality, US$ 1.5 million on general SPS and the rest for food safety and plant health.

[74] Of which: Global Early Warning System (GLEWS) US$ 4.1 million, Research US$ 3.8 million, Emergency Contingency Fund US$ 6.4 million, Networks of Diagnostic Laboratories and Epidemiology Units US$ 11.7 million, FAO/OIE Regional Support Units US$ 46.8 million.

In August 2006, the OIE proposed a three-year plan to improve Veterinary Services (VS) in developing countries (A57). Although the objectives of the plan are applicable to all TADs, especially zoonoses, due to the urgency of the current situation with HPAI, the programme is focused mainly on developing countries that are AI infected or at immediate risk. It aims helping those countries to have an effective VS, capable of detecting animal disease outbreaks as soon as they occur and responding rapidly to bring the diseases immediately under control. The plan is designed to bring the VS in the countries concerned into line with OIE international standards in terms of governance, organisation and functioning, and encourage an active partnership with the private sector. In therefore includes an evaluation of the national VS in the various countries[75] to determine their normative deficiencies, on the basis of which detailed projects to improve the VS are to be drawn and implemented during a preliminary pilot phase. This programme will be implemented in strong collaboration with the FAO, the WHO, and OIE regional representations.

Key priority actions and investments envisaged by the programme include *inter alia* the preparation of emergency plans and systems for early detection, rapid response and surveillance for priority diseases, strengthening the capability of public and private stakeholders (including through training), creation of a compensation fund for livestock producers, bringing diagnostic capability into line with international standards, and support for the creation of the relevant vaccines and antigens national stocks.

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[75] Including the currently under way evaluations of the VS with the use of the PVS tool.

4.2.3. Assessments of costs at national (country) level

As indicated in the previous sections, the costs of prevention and control systems depend on the specific conditions of each county, including the nature of the disease and its prevalence (**Annex 1**), the current situation of the VS and preparedness levels (section 4.2.1), and the structure of the sector. All these factors affect the costs of establishing comprehensive surveillance, implementing controls, and developing biosecurity. Consequently, these costs need to be defined as much as possible on a country by country basis.

In the case of HPAI, more detailed assessments of the costs involved at country level are available.

The data on total country needs from the ALIVE needs assessment for Africa indicated in the previous section (**Table 4** and **Table 5**), are based on estimates of the costs of the animal health component of the national plans for the prevention and control of HPAI for each of the 54 African countries covered by the project[76] (A258). These estimates are derived from an analysis of national AHI emergency preparedness plans, as drafted by most African countries themselves and are therefore derived from the countries' own assessment of the situation. It is also noted that the analysis and synthesis of the data by ALIVE has involved significant work, as the original plans are presented in a different way between countries in most cases. As indicated in **Figure 5**, the highest needs at country level were identified by Egypt, Kenya and Nigeria (accounting respectively for 14%, 12% and 11% of the total needs). This reflects the high risk perception and the importance attributed by the national governments of these countries to HPAI. The situation in Nigeria is further assessed in the case study on this country presented in this Report (section 5.3.).

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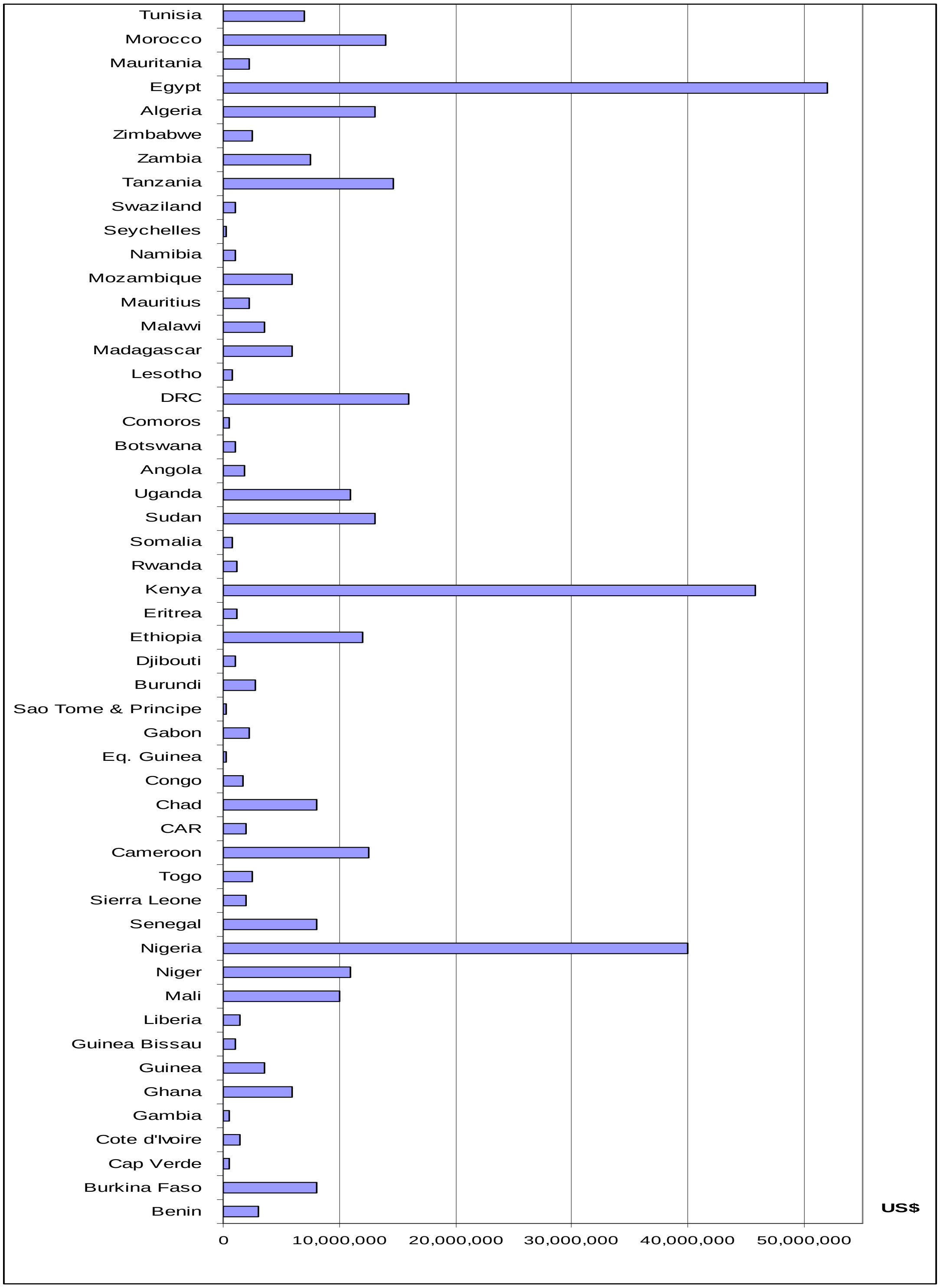
[76] Except South Africa and Libya, for which no detailed estimates of the animal health component are available.

Figure 5 Africa needs assessment for HPAI: animal health component by country



Source: ALIVE , as presented in Bamako, December 2006 (A258)

Other main sources of country data, for countries in Africa and in the other regions, have been the World Bank APL projects under the Global Program for Avian Influenza (GPAI)[77] and the national plans. As at present, a total 13 countries have received financing under the APL facility for integrated AHI preparedness and response projects, the majority of which are currently implemented. In terms of the national plans, as discussed in section 3.4.3, most countries currently have plans in drafting process. From a recent review of the countries that responded to the 2006 UNSIC survey (including some 125 developing/transition countries which are members of the OIE) in the majority of cases such plans are in drafting process (A236b).

Thus, APLs and national plans were obtained for 47 countries in total (in some cases, including Romania and Vietnam, both documents were available). Overall budgets, main components and budget breakdown per component are presented in **Annex 4**.

The following conclusions can be drawn from the analysis of these documents:

- In accordance with the recommendations of the competent organisations (OIE, FAO, WHO, WB), an increasing number of plans integrate the animal and human health components into a single strategy and approach. Nonetheless, in a number of cases, plans only deal with the animal health component. Conversely, some countries have pandemic influenza plans but no animal health plans as such. The preparation of an integrated plan is an objective of the assistance provided to countries under the WB APL facility.

- Comparisons between countries are difficult, as national plans tend to differ significantly in terms of lay out, contents, components, duration (in years) and the level of detail. As indicated above, this problem was also encountered by the ALIVE analysis of the African country plans. Furthermore, there is no systematic and uniform independent expert appraisal of the plans at present, which could be used as a guide to the quality of these documents[78].

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[77] The World Bank has two main mechanisms to help countries deal with avian influenza in animals and to prepare for a possible human flu pandemic. The first of these is a global funding program, formally known as the Global Program for Avian Influenza (GPAI). A description of the GPAI and an overview of its implementation to July 2006 are provided respectively in A43 and A135. The second mechanism are trust funds, notably the new multidonor Avian and Human Influenza Facility (AHIF) – which will channel approximately $75 million of the funds committed by donors at the Beijing Conference on avian flu in January 2006.

[78] Some plans have been reviewed/assessed by various bodies (e.g. the FAO, UN Technical Agencies, the WHO, the WB etc.), these reviews are not done in a systematic or uniform manner. Furthermore, results of these reviews are in most cases confidential or not readily available. The closest uniform analysis at present is provided in the November 2006 UNSIC survey which provided individual country profiles for the 155 countries that were covered by the survey (including some 125 developing/transition countries that are members of the OIE). The profiles were done in a standardised format, following the 6 success factors for AHI plans outlined by UNSIC (strong political commitment, clear procedures and systems for rapid implementation, attention to improved functioning of VS, incentives/compensation schemes provided, mobilisation of civil society and private sector, mass communication campaign), on the basis of information submitted by the countries and additional information collected by UNSIC agencies.

- For the same reasons, it is extremely difficult to draw overall conclusions on the detail of the plans across countries. Despite our efforts to obtain aggregate figures across countries of the costs of some of the plans' key components (e.g. surveillance, laboratory costs/diagnostic capacity etc.), this has not been possible due to the very different composition of these plans.

- The majority of countries have sought to strengthen veterinary services, in accordance with OIE standards focused primarily on animal disease surveillance, reporting of suspected outbreaks to national authorities, confirmation of diagnosis (through laboratory tests) and international reporting when the disease is detected (**Annex 4**).

In addition, a third source of information for our analysis have been the on-going country assessments undertaken by OIE trained experts using the PVS evaluation tool. Although this has so far been applied in a limited number of developing countries[79], while results are only available in draft and/or remain confidential at this stage, some early indications can be drawn from the assessments. It appears that the main areas where improvements are needed are the increase in veterinary personnel, training, improving epidemio-surveillance and laboratory capacity. These results are in line with the needs identified by most countries in their national plans but also the needs of developing countries in general, as identified by the international community.

Our analysis in this section leads us to the following conclusions and recommendations:

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[79] The PVS evaluations started in November 2006. Initially a pilot project, this has now become a fully-fledged instrument. As at end of August 2007, 50 formal requests from OIE Member Countries had been received, and some 36 PVS evaluation missions had been carried out. Of these 18 missions were in Africa (24 requests in total), 6 missions in the Americas (8 requests), 5 missions in Asia/Pacific and 5 in Europe (6 requests respectively each) and 2 missions in the Middle East (6 requests). The OIE intends to carry out some 105 evaluations over 3 years (i.e. approximately 35 evaluations each year, or 3 a month).

Literature review: assessment of prevention costs:

The difficulties encountered in comparing plans reflect the varying nature of the problems and concerns of each country, including in terms of disease occurrence, farming structures, and existing veterinary systems and infrastructure. These factors affect each country's objectives, needs and priorities. These specificities highlight the risks of extrapolating from ad hoc country cases to a regional and global level.

To overcome these constraints, the present analysis has been based on the global estimates provided by the World Bank, and on the Africa estimates by ALIVE (the latter based on individual countries' own assessments), as follows:

WB: global estimates of costs of improved prevention and preparedness (integrated animal health and human health) = US$ 1 billion for 2006-08 (average US$ 340 million per year);

ALIVE: Africa estimates of country needs (animal health only). Prevention and preparedness = US$ 44.4 million for 3 years (average US$ 15 million per year). Strengthening VS = US$ 32 million for 3 years (average US$ 10.6 million per year).

Our analysis highlights the importance of a systematic assessment of every country's needs, based on objective criteria. In this context, the recently started country reviews (using the OIE PVS tool) provide a substantial first step to this direction.

⇒ ***A recommendation here could be that the results of the PVS evaluations are followed up by detailed economic assessments of the costs involved in carrying out the recommended modifications to bring the assessed countries' VS in line with the OIE standards and their international obligations.***

4.3. Disease outbreak costs and losses

4.3.1. Overall impact

Given the complexity of issues and the relatively early stages in the advancement of the economic analysis of AH systems, the economic implications of animal diseases and animal disease control are largely under-studied.

In the case of developed countries, the direct and indirect costs of crises have generally been more extensively covered than is the case in developing countries[80]. Only more recently, HPAI induced losses in the developing/emerging economies of SE Asia have been studied in depth.

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[80] A notable exception is rinderpest, the economic implications of which have been extensively studied in the context of the Pan African Rinderpest Campaign (e.g. by VEERU, University of Reading).

A selection of examples of the overall impact of animal diseases is provided in **Table 6**. The relative scale of the overall impacts per country in the case of HPAI is illustrated in **Figure 6**.

Indirect or longer-term impacts (such as loss of consumer confidence, and repercussions on trade and tourism) are generally seen to be far greater than the direct or shorter-term impacts. There is wide consensus in the literature on this point, not only in respect of animal disease outbreaks (e.g. UK FMD, Asia and Africa HPAI) but more generally for public health crises (e.g. 2003 SARS experience in Asia). One factor that generally appears to contribute to relatively lower direct costs in developed countries is the fairly rapid response and reaction to crises. This factor is generally less present in developing/emerging countries although there is wide variation between countries.

In global macro-economic terms, the direct impact may be relatively modest, depending on the contribution of livestock to the national GDP. However, in the context of the rural economy as such, or in micro-economic terms looking at individual farmers, the impact can be devastating given that the affected farmers in most developing countries have few other sources of income and the sector is of fundamental importance for rural livelihoods and their survival (as discussed in section 3.2). In this case, serious poverty alleviation and food security concerns enter into the equation.

For example, in Vietnam - one of the countries hardest hit by HPAI - the total direct loss of the poultry sector has been estimated at less than 1 % of the national GDP (**Table 7**). Nonetheless, the relatively largest losses were felt by small-scale, often indebted, commercial chicken producers with limited other livestock activity. In addition, the number of rural households directly involved in poultry production has fallen by 50%. Although these smallest producers are the ones who have lost the least in absolute terms, in relative terms they have lost the most, when compared to their daily income (of 2 US$ per day or less, a financial position in which some 64% of households are found in Vietnam) (see section 5.2). In Nigeria, the situation for the rural and urban poor was even worse as these poor households often have few other sources of protein food or income (see section 5.3).

The total number of poor people dependent[81] on poultry in five of the currently most affected countries of Asia (Cambodia, Indonesia, Lao PDR, Thailand, and Vietnam), where some 60-80% of the rural population is assumed to keep poultry, is estimated at between 136-210 million (A40, A91). These figures exclude China's rural population likely to keep poultry, which could be as high as 450-600 million[82]. The FAO and the OIE estimate that between a third and half of the population in the most affected areas of South East Asia earn at least part of their income from poultry farming. In Nigeria, 60-70% of the population lives in rural areas and it is estimated that 80-95% of them keep poultry – in addition urban households frequently keep poultry (UNDP Nigeria data); this picture is representative of most sub-Saharan Africa.

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[81] This includes people that are partially dependent on poultry, although even in this case dependence can be crucial for rural livelihoods.

[82] According to China's latest nationwide census the Chinese population in 2001 stood at 1.26 billion, including people living on the island of Taiwan. Some 60% of this is estimated to be rural population (their relative share has fallen by an estimated 25 percentage points in the last decade due to massive urbanisation).

The macro-economic impact will be considerably more severe when the indirect effects of an epidemic on trade, tourism and services are added to the direct effects on the livestock sector as such, given that these sectors make a relatively large contribution to the national GDP in most economies. If potential (and extremely difficult to estimate) human pandemic costs are added, and when dynamic multiplier effects are considered (i.e. the domino effects that the decline in one sector in one country may have on all areas of economic activity and on other countries, including as remote sectors as the stock markets[83]) the global impact on the economy may be comparable to a severe recession[84].

Table 6 Overall impact of animal disease outbreaks: selected examples

Country	**Impact**
Asia	The total losses in GDP accruing from the damaged poultry sector in Asia amounted to US$10 billion. (This is calculated on the basis of over 150 million poultry destroyed as the result of the 2003 and 2004 Asian **HPAI** outbreaks. It includes direct and indirect economic impact and trade losses for the region as a whole). (A40)
Asia Thailand Vietnam (a)	According to Oxford Economic Forecasting the total GDP losses accruing from **HPAI** in 2004 are estimated at US$ 10–15 billion for Asia, of which US$ 1.2 billion are accounted for by losses in Thailand, and US$ 0.3 billion in Vietnam. These estimates are based on an assumed quarter-year loss of income for poultry farms, and include Asia-wide multiplier effects from the farm losses. The scaling up of health-risk impacts, e.g. from AI in birds to a more generalised problem for livestock and a drop in tourism, could create annual economic losses of as much as US$ 50–60 billion, even if human cases of disease were to remain limited. Escalation of the latter would have yet more serious implications.
Thailand	Significant trade losses for a country that used to be the world's fifth largest poultry exporter before the **HPAI** outbreak, the cost of animal disease surveillance and control, and livelihood losses to poultry keeping households are estimated to have resulted in 1.5% national GDP loss (A76). In April 2005, the Thai PM stated that avian flu had cost his country some US$1.1 billion.
Indonesia	In Indonesia, the value of birds lost as such to **HPAI** is estimated at US$16-32 million, the total direct loss to the broiler and layer breeders and producers at US$ 171 million and, when indirect losses are added, the total loss goes up to US$ 387 million or a factor of two. (Data source: Indonesian Poultry Information Centre). These estimates do not account for the loss incurred by village/ backyard farmers, estimated at 30 million households keeping 200 million chickens. (A76, A91)
Nigeria (a)	On the whole, the total economic cost due to the **HPAI** crisis including direct and indirect losses is

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[83] See for example IMF analysis on the global impact of avian flu on financial markets (A77).

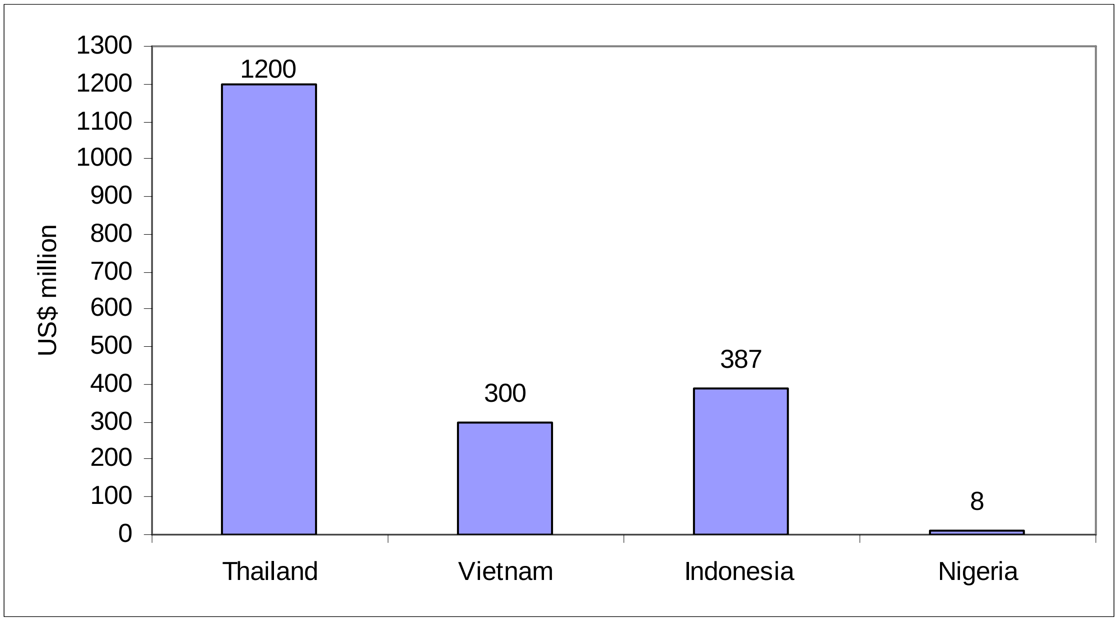
[84] See for example, the estimated macro-economic effects on the Australian economy, based on the Treasury macro econometric model (TRYM). The model incorporates 6 steps and accumulates the impact in each step (in order: global demand shocks, deaths, labour market, effects on consumption, business climate and investment). When all steps are added, the total effect to the economy is a 5% fall of the GDP. This is about half the level of the recession in the Australian economy caused by the Great Depression. As discussed elsewhere, these results should be treated with caution as they are very dependent on the underlying assumptions and scenarios. (A179)

Country	Impact
	estimated by the UNDP Nigeria at about N1 billion (US$7.9 million). (A293)
UK	In Britain, as a result of the 2001 **FMD** epidemic, four million susceptible animals on 10,157 premises were slaughtered (of which only 2,026 premises were actually declared infected) and a further 2.5 million animals were slaughtered for reasons of welfare, such as overcrowding and compromised nutrition; when the total number of still-suckling lambs, calves and pigs that were slaughtered is included, the total could be as high as ten million. The financial cost of the FMD epidemic, based on the slaughter of the four million susceptible animals only, was estimated at over £5.8-6.3 billion (depending on the assumption made for the spill-over impact). This includes £3.1 billion losses for the agriculture and food chain and £2.7-3.2 billion in losses sustained by the leisure and tourist industry. The social cost – evidenced in the loss of public confidence by the many newspaper reports and submissions to the various inquiries conducted after the epidemic – can not be quantified. Despite the magnitude of the losses, in relative terms, the effect of the outbreak was estimated to be less than 0.2% of the national GDP for 2001, which appears to be modest in comparison to normal economic fluctuations. (A228, A166).
Italy	In 1999–2000, the outbreak of **H7N1 HPAI** in Italy resulted in US$122 million in compensation for destroyed birds, and it was estimated that indirect costs exceeded US$400 million, bringing the total cost to over US$512 million. (A144)
Ireland	The 2001 **FMD** outbreak in Ireland cost around US$ 5 billion in the space of 4 months, with indirect costs representing more than 95% of the total cost. (A253)
NL	A model applied to the 1997/1998 **CSF** outbreak in the Netherlands (in which over ten million pigs were slaughtered), estimates the total financial consequences of the outbreak at US $2.3 billion. Consequential losses for farmers are US $423 million (18% of the total) and losses for related industries are US $596 million (26% of the total). Budgetary consequences for the government include less than 50% of the total losses calculated by the model. (A143)
Canada	In a 2002 study of the economic impact of a potential outbreak of **FMD** in Canada, the total Net Economic Impact (NEI) was found to vary from a low of $13.7 billion, assuming optimistic conditions under a small-scale outbreak, to $45.9 billion for a large-scale outbreak. Impacts associated with the large-scale outbreak included: trade loss of approximately $19.6 billion (or 5% of Canada's total export sales from all sectors in 2001); $26.4 billion cost to the industry, representing 80% of the 2001 Canadian primary agriculture sectors' market cash receipts; significant loss in the tourism and other non agricultural sectors of the economy ($6-$7 billion), an amount exceeding the direct costs of the outbreak to the primary sector. (A112)

(a) More extensive information on these countries can be found in the case studies

Source: compiled by Agra CEAS Consulting

Figure 6 Overall impact of HPAI outbreaks: selected examples



Source: Table 6

The sections below provide an overview of how disease outbreak costs and losses are covered by the available literature, and discuss some of the key findings of the available research to date. Our analysis follows the typology of outbreak costs presented in **Table 2**, distinguishing between direct and indirect costs and losses.

4.3.2. Direct costs and losses

A selection of examples of direct production costs and losses is presented in **Table 7** and **Figure 7**. More detailed comments are provided by type of impact below.

4.3.2.1. Direct production losses

On a global scale, it is estimated that within the past two years more than 250 million poultry have died or been culled as a result of avian influenza (FAO estimate, as at end of October 2006). In Africa, based on the experience of the outbreaks so far, it is estimated that 5% (around 66,000,000 poultry) of the total poultry population (South Africa not included) would be culled within 3 years (Alive estimates) (**Table 7**).

Even though these figures are substantial, seen from the perspective of the global size of the sector the global poultry population dead/culled only accounts for less than 1% of the 52 billion birds slaughtered annually in the world.

However, given the dependence on the poultry sector of poverty stricken households in the developing world and especially the least developed countries, the culling and high mortality of birds has a significant impact on their livelihoods[85]. This impact is compounded by the consequential on-farm losses and the broader indirect effects discussed below.

It is noted that in a given production system, an inverse relationship appears to exist between production losses and control costs, in that the higher the treatment and control expenditure the lower the losses and vice versa. Moreover, this relationship between losses and expenditure is non-linear reflecting the non-linear nature of the classical production function (A115).

4.3.2.2. Control costs

This type of cost is rarely documented with data. Only in the case of FMD outbreaks in developed countries (e.g. UK), and the more recent HPAI outbreaks in both developed and developing countries, these costs were explored in depth.

Given the data scarcity, any global estimates of the control costs available by literature usually draw on the above cases. For example, the African assessment of needs and gaps in the context of HPAI (A258) evaluates the operational cost of the culling team activities, disinfection of premises and disposal of dead birds taking into consideration the experience of two of the most documented cases: Vietnam and Nigeria (**Table 7**).

4.3.2.3. Other direct production losses

Widely referred to as consequential on-farm losses, these depend on the period that the farmers stay out of production during and after the crisis is over. These types of losses are generally not well documented in the literature and therefore difficult to assess and quantify.

In the case of HPAI, given that poultry restocking should normally take place only a minimum of 3-4 weeks after the premises have been cleaned and disinfected (following OIE and FAO recommendations but also as demonstrated in practice in the countries affected by HPAI – see for example A91), a month can be considered as the minimum disruption period.

A distinction should be made between restocking in the village and backyard farming system, which appears to be an autonomous process, and restocking in commercial and industrial systems. Generally, the main problems that farms in the latter sector encounter in continuing with poultry raising are related to the high prices of inputs, difficulties in procuring day-old chicks and fear of resurgence of Avian Influenza. Evidence has shown that even without these problems, it takes a long time to re-stock to pre-outbreak levels. For example, with no constraints to restocking (i.e. assuming day-old chicks and other inputs are readily available) the time taken to complete restocking in Vietnam was estimated to be 12 months for the backyard system and 5 to 8 months for the industrial and commercial systems (A91). These losses can be mitigated if farmers can switch to alternative production, as was the case for example with certain farmers in some SE Asian countries who moved into pig farming. In general, however, such losses have a longer term impact on the sector's restructuring as discussed in section 4.3.3 below.

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[85] It is noted that the impact of HPAI on small holders of poultry is not new, as these holders are accustomed to large losses through NCD.

There is also an effect on employment, which appears to be determined by the degree of commercialisation and industrialisation in the sector and therefore the level of employment it generates. For example, following the Asian HPAI crisis, countries whose poultry sectors are less industrialised like Lao PDR and Cambodia had a small loss of jobs, compared to Indonesia which has a considerable share of farms in commercial systems 1 and 2.

Another way of looking at the global direct costs and losses is through the poultry sector's contribution to the GDP. The WB has undertaken such analysis in the case of SE Asian countries, demonstrating that the direct impact on the region could be 0.1-0.2% of the GDP depending on the importance of the poultry sector in the economy (**Table 7**).

Table 7 Direct production costs and losses: selected examples

Country	**Impact**
Direct losses	
Vietnam (a)	In the first **HPAI** outbreak in 2004, 58 out of 64 Provinces were affected, and 17% of the total national poultry flock of 262 million birds (about 44 million) lost. The loss in terms of the value of birds was estimated at VND 800 billion (assuming an average farm gate price for chicken of VND 20,000 before AI) or US$ 53 million. According to other sources the value of the birds lost is even higher. In the second wave of outbreaks, the costs were smaller due to a less drastic approach to culling in which clinically infected birds only were slaughtered, and because the disease spread less. (A9, A16, A91, A204, A292) The central government budget allocated to AI compensation up to June 2005 amounted to VND 268 billion (US$ 17.2 million) (A3).
Thailand	After Vietnam, direct losses from **HPAI** were highest in Thailand: 29 million birds or 14.5% of the poultry population (A76). In spring 2005, the government reported it had paid some $55.8 million to farmers as compensation for the mass chicken culling (25.9 million birds were culled, A16)
Indonesia	In Indonesia, 15 out of 30 provinces were infected with **HPAI** and 17 million birds (15 million layers and 2 million parent stock) died or were stamped out. The value of birds lost was between US$16.2 and 32.4 million (A16). These estimates are based on a price range of typically US$ 1-2 per bird, subject to weight and type (broiler or layer). The Indonesian Poultry Information Centre estimates the total direct losses of the broiler and layer breeders and producers at US$ 170.9 million. These figures do not account for the loss incurred by village and backyard farmers for which no accurate estimates of total losses are available. It is believed that the greatest loss was among backyard village farmers, estimated at 30 million households keeping 200 million native chickens or 63% of total poultry population. (A16, A40, A91, A292)
Nigeria (a)	The **HPAI** outbreak caused a loss of approximately 890,000 birds through deaths and stamping out as at mid-June 2006 At an average farm gate price of about N700 per bird, the farm gate value of the birds lost was about N 617 million (or US$ 4.8 million). These figures are based on official estimates, and are believed to under-estimate reality, because the actual poultry population wiped out in rural areas remains unknown (A293).
Uruguay	Following the 2001 **FMD** outbreak, the direct costs involved in the implementation of the initial

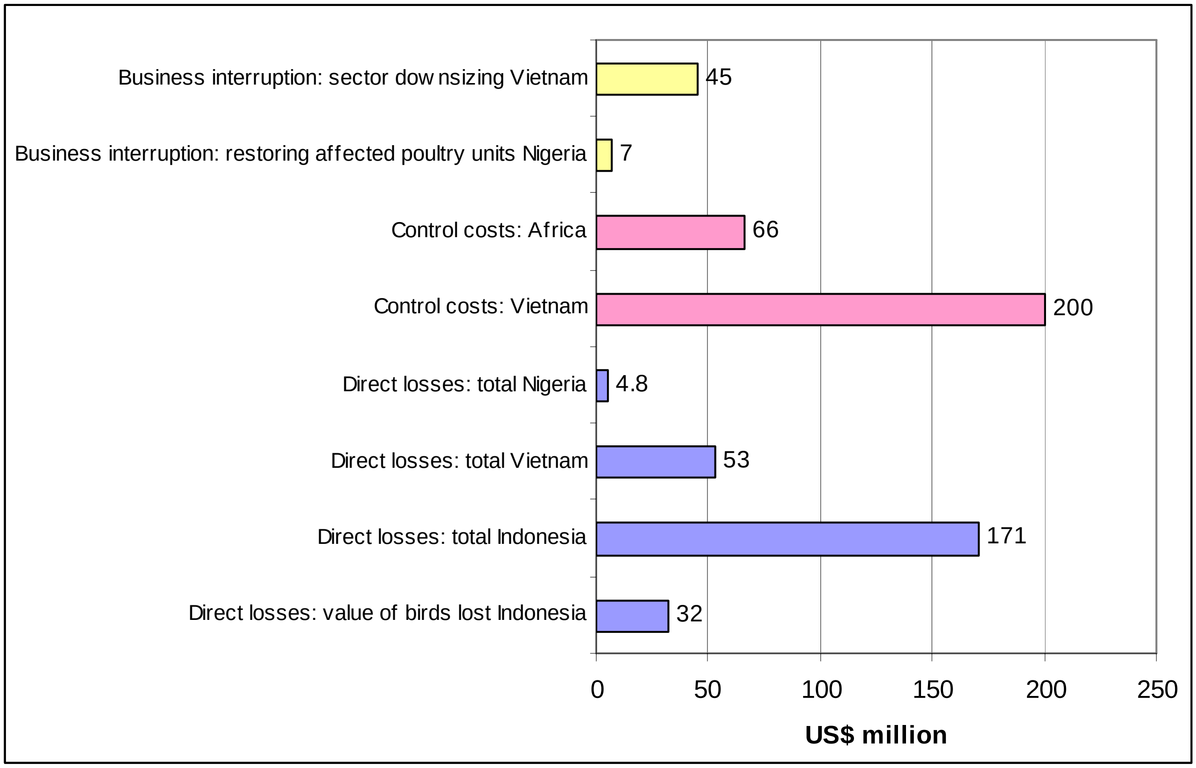
Country	Impact
	sanitary containment measures, which included the disposal of 5,424 cattle, 1,511 sheep and 333 pigs, amounted to over US$2 million. The costs involved in the secondary round of containment measures, which included the costs of vaccinating cattle in the immediate vicinity of the affected areas and the costs of the nation-wide vaccination campaign covering the entire cattle herd that will follow, were estimated at US$18.2 million. (A259)
Control costs	
Africa	Given that in Africa, some 5% (around 66,000,000 poultry) of the total poultry population could be culled within three years if **HPAI** continues to spread at current rates, and estimated to cost about US$ 1 per bird (Alive estimates, A258), the total control costs of a pan-African outbreak could reach at least US$ 66 million (e.g. above figures exclude South Africa).
Vietnam (a)	In the case of the Vietnam **HPAI** outbreaks, it was estimated to cost about US$ 0.25 per bird to cull and dispose approximately 200 chickens per farm. Direct losses (value of birds plus culling costs) from the first wave of the outbreak in 2004 (when the culling operations were more extensive) were estimated to be over $200 million. (A7, A9, A91)
Nigeria (a)	In the case of the Nigeria **HPAI** outbreaks, culling teams were organised on an ad hoc basis and the costs were estimated to reach about US$ 1.00 per bird, if the team culled 1,000 birds within a day. (A7, A258).
Consequential on-farm losses	
• **Business interruption**	
Vietnam (a)	Vétérinaires Sans Frontières (VSF) conducted a case study of a village in the highlands of North Vietnam which estimated that a smallholder lost between US$ 69 and US$ 108 from the **HPAI** outbreaks, including the value of lost birds, loss of an average 2.3 months with no activities, and loss of no income and consumption during the period of no activities. In Vietnam about 18% of the households earn less than US$1 per capita a day and 64% of the households less than US$2. (A76)
Nigeria (a)	The cost of restoring the affected poultry units back to their original level (i.e. before the **HPAI** outbreak) is estimated at about N889 million (or $6.95 million). In addition, there was a 45% drop in the flock size of the non-affected farms, mainly because of lack of funds to feed the birds (due to the drop in poultry sales) which forced many farmers to reduce flocks, and it is unclear whether these farms will recover. (A293)
Asia	The size of the poultry sector in the national economies of the Asian region before the **HPAI** epidemic ranged from around 0.6% of GDP at the low end in countries like Vietnam and Thailand, to a high of a little over 2% in the Philippines, with most countries averaging a little over 1% of GDP. In an economy like Vietnam, where poultry output is down by around 15%, this part of economic loss is worth about 0.1% of GDP or about $45 million. If similar declines in poultry numbers were to occur in an economy like Indonesia where the poultry sector plays a somewhat larger part in the economy, these direct costs could amount to 0.2% of GDP. (A140, A140a)
• **On-farm employment**	
Lao PDR	Lao PDR and Cambodia poultry sectors resulted in a small loss of jobs (as low as 52 jobs in Lao

Country	**Impact**
Cambodia Indonesia	PDR), where a total stamping out of all poultry was undertaken on 42 intensive commercial enterprises following **HPAI** outbreaks. By comparison, in Indonesia, a survey reports that 23% of permanent workers on industrial and commercial farms lost their jobs and more than 40% of family members were unable to continue to work with poultry as farms closed. (A91)
Indonesia	In Indonesia, an estimated 23% of industrial and commercial farm workers lost their jobs following the **HPAI** outbreaks and 40% of these were unable to find alternative employment. (A8)
Nigeria (a)	The UNDP rapid assessment survey revealed that 80% of workers in the affected farms and 45% of those working in non-affected farms have lost their jobs as a result of the **HPA**I outbreak. (A293)

(a) More extensive information on these countries can be found in the case studies

Source: compiled by Agra CEAS Consulting

Figure 7 Direct production costs and losses of HPAI outbreaks: selected examples



Source: Table 7

4.3.3. Indirect impact

Generally, the available research points out that indirect costs are typically significant multiples of direct plus consequential on-farm costs and losses, although it should be noted that at the same time the literature also uniformly stresses the difficulties of measuring the precise extent of these costs (A228, A159, A258, A292).

Such costs are rarely explored in depth in the available literature, largely due to the methodological difficulties and constraints of this type of analysis and its extensive data requirements. Assessing the overall impact of an animal disease on both global meat markets and other sectors along the supply chain necessitates the use of a framework which links markets, both spatially and cross-commodity. Moreover, the resulting impact assessment is dependent on the various assumptions underpinning the analysis and constrained by data limitations. Broadly, a distinction can be made in the available literature between ex-post assessments of the actual impact of a disease outbreak that has occurred and ex-ante simulations of the potential impact of a disease outbreak in the event this occurs. The latter are particularly difficult to perform, and results are inevitably shaped by the underlying assumptions and scenarios. Great caution should therefore be paid in the interpretation of the results.

From the experience of developed countries (where literature on the indirect costs of a disease is generally more advanced), the direct costs – although significant – are usually relatively lower than the considerable indirect costs caused by the loss of consumer confidence and the impact on export trade. The overwhelming evidence of the available research suggests that where the response to a disease outbreak has been rapid and strict control measures have been applied, coupled with an effective communication campaign towards the wider public, the indirect impacts tend to be more contained.

It is important to note that economic analysis to date has focused on the impacts of ad hoc outbreaks rather than the long term effects of endemic diseases, in other words of smaller but repeated outbreaks over a number of years. It has also mostly focused on the domestic impact (within a country or economic zone e.g. the EU) of an outbreak rather than the global market impact.

However, the international community is increasingly concerned about the global social and economic impacts of endemic diseases as such. This is partly due to changing times. While many animal diseases, particularly FMD and most types of AI, have long shown signs of becoming endemic in many parts of the developing world, only since 2001 has the severity of outbreaks of FMD (in Europe and Latin America) and more recently AI outbreaks in Asia (and moving westward into Europe and Africa) demonstrated that such events can have a significant impact on international meat markets.

The relative importance of these impacts can be highlighted in the context of the global growth in meat production and trade of the last 15 years. World meat production has grown from 100 million tonnes in 1990 to nearly 280 million tonnes in 2006. Nearly three quarters of this growth is concentrated in developing countries, and is accounted for by the pigmeat and poultry sectors. Global meat trade has grown in similar rates from 8 million tonnes in 1990 to nearly 20 million tonnes by 2006. The value of meat trade has also increased, but at a lower rate than the volume, indicating the declining trend of meat prices and the changing meat product composition of trade (much of the growth has been driven by growing demand for poultry cuts, due to health and economic factors notably the lower prices of poultry meat relative to other meats). The most significant contributor to the growth in trade has been the poultry industry (followed by pigmeat), so that the poultry sector’s share of world meat trade has risen from 22% in 1990 to over 40% in 2005. Consequently, a severe transboundary disease outbreak such as HPAI can have potentially destabilising effects on international poultry markets and can disrupt the sector's growth prospects (at least in the short to medium term) in the developing world.

4.3.3.1. Ripple effects

In terms of the costs that are more systematically covered by literature (price effects, trade impact and impact on upstream/downstream activities), from a review of the available research the following conclusions can be drawn:

a) Price / demand shocks

On the basis of economic theory, the effect on prices will depend on the balance of supply and demand shifts caused by the outbreak, and whether the affected country is a closed (limited net trade) or an open (trade oriented) economy. In a closed economy, the anticipated impact would be price falls in the affected areas and for the affected products if there is a consumption shock, but higher prices if supply falls and there is no change in demand. In open economies (importing or exporting), prices will be more affected by instability in world markets (and may also contribute to it). In the latter case, prices even in disease-free countries will be affected (e.g. an importing or exporting country facing higher prices in the world market, or where consumer demand is affected by the international crisis). With increasing trade and globalisation, the effects on disease-free countries have become more pronounced. Some examples of such effects can be found in **Table 8**.

At a global level, the net effect on prices of an animal disease outbreak is less clear. Certainly, meat markets affected by animal disease outbreaks are characterised by considerable instability as governments are forced to adopt policies to protect their livestock sectors, including import bans, tighter sanitary border control measures, and stronger domestic regulations including movement controls and quarantine, which result in increased price volatility both in domestic markets and worldwide. Some countries will loose, but other countries will gain due to the higher prices offered to products from disease-free markets (not necessarily countries, but even regions/compartments if such policies are applied). But the compounded net effect could be in either direction.

The global impact depends mainly on 3 factors: a) the supply and demand balance worldwide for the affected products (this is strongly dependent on the extent of consumer health concerns, which tends to vary between countries and cultures as is evident from the examples quoted in **Table 8**) , b) the level of concentration in global meat markets and the position held by the disease-affected as well as the disease-free countries within this (i.e. whether they are a major exporter/importer), and c) the world supply and demand in substitute products.

For example, in 2004, the HPAI outbreaks led to a more than 30% increase in international poultry prices, which is attributed not just to HPAI-induced pressures in the world poultry market but also to the simultaneous BSE-related pressures on the international beef market (A111d). By contrast, since late 2005, AI outbreaks in approximately 40 previously unaffected countries (many of which are the major poultry consuming and importing countries of Europe, the Middle East, and Africa) may have prompted the sharp decline in the FAO poultry price index during the same period. In 2001, as a consequence of the severe FMD pandemic that prompted countries around the globe to close their borders to imports, international prices for beef and pigmeat fell, while poultry prices rose.

Generally, supply volumes tend to remain below pre-AI levels at least in the short to medium term (6 months to 1 year), and only recover in the longer term (beyond the first year). Within this general pattern, evidence suggests that stakeholders associated with more industrial production (i.e. production system 1) are capturing higher prices than before, while the other stakeholders still face collapsed demand and prices that are significantly lower than before (A9). This is largely due to the fact that a) they can more rapidly recover from the crisis due to access to credit and inputs, and b) can move to more bio-secure production methods with certified products typically attracting a price premium.

It is unclear what the longer-term impact of disease outbreaks on demand would be. Recent international surveys conducted following the various outbreaks of HPAI around the world, but also country surveys and evidence, indicate that the short term impact is very significant and that the change in consumer behaviour may persist for considerable time (e.g. 2006 Eurobarometer and IPSOS surveys, **Table 8**).

b) Trade impact

The loss of access – or opportunities for access – to regional and international markets tends to have much more important economic implications than production losses alone. The extent of the damage will depend on a country's export orientation and can be quite severe for countries that had an important and established export market pre-outbreak. Thailand, for example, lost its position from being the world's fourth largest poultrymeat exporter prior to the HPAI outbreak (**Table 8**). To some extent, in the short to medium term, the loss can be mitigated if a country can switch to alternative exports (for example, in the case of Thailand, by switching to processed poultry meat it regained most of its export value), but the longer term sustainability and outlook of these new markets is uncertain.

Conversely, the eradication of certain major diseases to gain access to "high value" export markets can bring considerable benefits, as has been the case in parts of SE Asia and Latin American countries (e.g. Uruguay, **Table 8**). Also, it appears that the introduction of "derogation" measures (zoning, compartmentalisation[86]) by the OIE can mitigate some of the losses in disease-affected countries (A283), but also temporarily offset certain countries' lack of export capacity while they acquire national capacities to prevent and manage crises (A292), as discussed further below.

As already discussed, even where sophisticated economic modelling has been applied, it is extremely difficult to capture the impact of an animal disease on exports and international trade (both to estimate the impact of an actual outbreak and to forecast the potential impact of an outbreak under different scenarios). Exports take place within a dynamic economic, commercial and policy environment, where a range of factors interplay and affect competition between countries and between sectors. The incidence of a disease, however, can add to other factors (such as increased competition from a new exporter, or increased demand for substitute meats / protein sources in international markets, or depressed prices in competing sectors), to amplify the global impact. Thus, where such models have been applied, this has taken place within a precise scenario framework and results depend heavily on the underlying assumptions (see for example the application of the FAO STM model below).

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[86] The OIE recently included the concept of compartmentalisation in its guidelines on avian influenza control (OIE, 2005). It has been stressed that this strategy needs to be adopted with particular attention to country level production characteristics, and that it should be agreed bilaterally between trading partner countries as has always been the case in the context of bilateral trade agreements (A53).

In terms of the global impact on trade from outbreaks of transboundary diseases, the size of the impact will depend on whether the outbreak occurs in significant world exporting countries, in which case a ban on exports from that country can send significant shocks to other major exporting as well as importing countries. For example, in 1997, the EU classical swine fever outbreak significantly affected intra-EU trade, as the Netherlands was a major exporter of pork and live pigs within the EU, but global pork trade was largely unaffected since the Netherlands, as well as Germany, Belgium, France, Italy and Spain, were not major exporters of pork outside the EU. By contrast, in 1996/97 the global pigmeat market was affected by the FMD outbreak in Taipei China, a major world exporter whose pork exports fell to 15% of the previous year's value (**Table 8**). Furthermore, the net trade position of a major trading country can determine how localised the impact of an animal disease will be, and the impact is likely to be different when an affected country is both a major world exporter and a major importer, compared to a situation where an affected country is a significant exporter only.

While it is possible to identify the resulting diversion in trade flows, as one country's loss can be another country's gain, the resulting net effect in terms of total loss in world trade revenues is difficult to establish. Available evidence suggests it is rather substantial. For example, restrictions on trade as a consequence of BSE notifications may have resulted to an estimated net loss of US$4.1 billion in world trade (**Table 9**). According to some analysts, the various world-wide import bans on meat from disease-infected areas, combined with heightened border inspections and testing, have limited global meat trade growth, from the 7% annual gains witnessed during the late 1990s to only 2% annually over the past few years (to 2006) (A111d). Given a global volume in meat trade of about 18 million tonnes and a global value estimated at US$72 billion (2004 estimates, FAO), this represents a potential annual loss in trade of some 0.9 million tonnes (or US$3.6 billion). In 2001 the severity and visibility of the FMD pandemic that affected major meat markets (EU, Mercosur) led to countries around the globe closing their borders to at least 25% of world beef trade and nearly 40% of global pork exports. In 2004 and 2005, the impact of the AI outbreak in Asia led to an unprecedented 8% decline in global poultry trade, and a loss of approximately US$ 1 billion in export earnings for the Asian region alone. With the continuing menace of AI, it is estimated that global poultry trade value is down nearly US$2 billion in 2006 (A295).

Due to the complexity of the factors involved and the methodological difficulties, very few studies have tried to forecast such global aspects of the potential trade impact. A notable exception is the FAO/OECD short term commodity model (STM)[87], which has been used to evaluate the short term global impact of a potential outbreak of Avian Influenza (as well as FMD and BSE) in different parts of the world. The model attempts to measure the impact of exogenously imposed export shocks to baseline projections. The potential impact is evaluated under difference scenarios of consumption shocks that the crisis may provoke to the EU-25 and/or the rest of the world, with implications on export volumes and domestic/international prices. The model scenarios and assumptions are constantly revised in view of new developments in animal disease occurrence (preliminary model results in A76, A111d and A283).

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[87] Developed in the context of Aglink-Cosimo, a collaborative modelling project between the OECD and the FAO. This is presently one of the most comprehensive partial equilibrium models for global agriculture and it is one of the tools used in the generation of baseline projections underlying the OECD-FAO Agricultural Outlook. It is a dynamic, multi-commodity, partial-equilibrium, global trade model, which provides one-year-ahead projections for demand, imports, exports, stocks and prices, given predetermined supply for 18 basic agricultural products, covering 50 countries /regions. Four meat categories, sub-divided into disease-affected and disease-free markets, are included in the model alongside a comprehensive coverage of the feed sector. Changes in real income, population and exchange rates are the principal exogenous variables driving global agricultural commodity markets. This model has also been used to evaluate the impact of FMD and BSE.

The latest results (December 2006, A283) indicate that in the event of a global consumption shock due to AI (assuming this results in a 10% shift in global consumption away from poultry to other meats) international poultry prices would fall by 7% while pigmeat and beef prices would increase substantially (11-16% for beef and 15-19% for pigmeat). The net effect on world trade would be a fall in exports by 13% (while exports of developing countries would fall by 19% and imports by 12%). If the outbreak only occurred in the EU-25 (and assuming a 10% shift in EU consumption away from poultry) the effect on prices and global trade would be minimal but developing countries would expand their exports by 6% and drop their imports by 9%. A hypothetical outbreak in Brazil would result in a 3% increase in poultry prices and a 6% fall in world trade, although developing countries would increase their exports by 17%[88].

The same model demonstrates the importance of regionalisation policies in mitigating the trade losses caused by outbreaks not just in the disease-affected countries but for the world. Model results indicate that in the event of an FMD outbreak in Brazil, Brazilian exports of beef would fall by 9% and 60% respectively if regionalisation was applied, compared to a total ban on exports if regionalisation was not applied. Given that Brazil is the world's largest beef exporter, the application of regionalisation has dramatic effects on world trade (reducing the impact to virtually zero) compared to a scenario where the policy is not applied (in which case the global decline in exports is 9%). These effects are reflected in world prices, with a significant containment in the decline of Brazil beef prices when regionalisation is applied (from 56% drop in the policy-off scenario down to a 7% in the policy-on) as well as significantly halting world price increases for beef.

A selection of examples of the various ripple effects in terms of demand and trade impacts, caused by disease outbreaks in different parts of the world and at a global level, as identified from the reviewed literature, can be found in **Table 8** below.

Table 8 Ripple effects: selected examples of demand/price shocks and trade impact

Country	**Impact**
Demand/price shocks	
global	An international survey of 19 countries (including Argentina, Brazil, Chile and Thailand) conducted in May 2006 shows that in most countries, about a fifth of the respondents reduced their consumption because of concern over AI. The impact was higher (30%) in **HPAI**-affected countries like Thailand and Italy, but even in HPAI-free countries such as Argentina and Brazil some 15% of respondents were affected. (A255)
Vietnam	A 2004 FAO survey found that in Vietnam and Cambodia, prices of non-poultry meats rose up to 30% when live-bird markets were disrupted by **HPAI** and remained high even after the poultry

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[88] As already discussed, results depend on the scenarios and assumptions made, for example on consumer response. With potential outbreaks and consumption shocks uncertain, the above scenarios are only some of the possible impact assessments that can be made. Indeed, the results differ substantially from previous runs of the model using different assumptions (A76, A111d). These results should therefore be interpreted with caution.

Country	Impact
Cambodia	markets recovered, taking the purchase of meat out of reach for low income consumers. (A40)
Vietnam (a)	At the lowest point of the **HPAI** crisis (Oct/Nov 2005), prices were 50-60% below normal, and one observer reported that the volume of poultry sales had fallen by half, from about 40 million poultry per month to 20 million. When prices started recovering in December they were 30-60% lower than pre-outbreak levels, but supermarket prices were 25-35% higher. The volumes sold daily (poultry and eggs) were lower than pre-outbreak levels. (All unofficial data.) (A9)
Vietnam (a)	In HCMC, there was a sharp decline in the number of poultry and egg markets. Although the net effect on producers depends on market volume rather than the number of outlets as such, given that these new markets are entrusted with selling certified produce only this suggests a significant shrinking of the market for non-commercial farmers. In addition, these farmers and markets that sold certified products were able to capture higher prices. (A9)
Cambodia	Although the impact of HPAI in terms of direct deaths and control measures (stamping out) was relatively minor, according to data by Veterinaires Sans Frontieres (VSF), a significant drop in the prices of poultry products was seen during the first 2 months of 2004 (followed by complete recovery) (A76). Combining the fall in prices with the fall in quantities sold and comparing this with the recovery rates in the markets, it appears that broiler traders took up to 3 years to recoup their losses and egg traders nearly a year. (A16)
Indonesia	According to data from the Indonesian Poultry information Centre, the price of a live broiler fell from around Rupia 8000 per kg in January 2004 to as low as Rupia 4000 in some locations at the end of February, and only recovered to the pre-outbreak level by May. (A91) According to other reports, the price fell to Rupia 1200 per kg after the outbreak, but by April it reached Rupia 10000 per kg. (A16)
Nigeria (a)	Egg and chicken sales declined by 80% within 2 weeks following the announcement of **HPAI** outbreaks in Nigeria in February 2006 (UNDP data and Nigerian Poultry Association – PAN). Up to 4 months after, the recovery rate was still below 50%. (A293)
Ghana	A survey of consumers/stakeholders in Ghana showed that the eating habits of almost half the respondents changed after **HPAI** media announcements. Interestingly the public health and the animal health workers were the categories of respondents whose eating habits changed the most in that 75% of them stopped eating completely poultrymeat. (A291)
Turkey	In Turkey, the combined effect of the two **HPAI** outbreaks of October 2005 and January 2006, led to both broiler and egg prices falling by about 30%. The market has taken almost a year to recover. In the first outbreak alone, poultry sales dropped by 50% and prices by 40%, while the market took 2 months to recover. (A295)
Egypt	In Egypt, prices for poultry fell by almost 30% in 2 months after the announcement of Turkey's **HPAI** outbreak in September 2005 and continued falling to February 2006 when Egypt's outbreak was announced. Following mass culling there was a sharp price increase in the next 4 months. Overall, prices have taken almost a year to recover to pre-outbreak levels. Egg prices fell following the outbreak but recovered quickly at considerably higher than pre-outbreak levels. (A295)
EU27+	A special Eurobarometer survey conducted in March/April 2006 on consumer response in the EU-27 following the world **HPAI** outbreaks revealed that nearly a fifth of citizens had reduced their

Country	**Impact**
	consumption of poultry meat (18% on average, with large country differences). Although three quarters of this group did so only on a temporary basis, some 13% intended to cut down on consumption permanently. (A190) Sales of poultry and eggs were reported in early 2006 to have fallen by 70% in Italy and by 20% in France, following announcements of AI outbreaks in other parts of Europe/the world (A144). The Italian farmers' association estimated that the industry was losing €6m a day, and that it had lost a total of about €650m thus far.
Trade impacts	
Global (Argentina Uruguay)	In 2001, the severity and visibility of the **FMD** pandemic, combined with **BSE** concerns, led to countries around the globe closing their borders to at least one-quarter of world beef trade. Trade losses for Argentina and Uruguay were estimated at US$ 400 million and US$ 150 million respectively. (A111d)
Global	The results of a 2000 study quantifying the impact of **BSE** on world trade suggest that economies affected by BSE notifications saw a decline of US$5.6 billion while unaffected economies saw an increase of US$1.5 billion (in both cases, from hypothetical projections in designated products). Thus, it may be concluded that import restrictions to control the spread of emergent BSE infection had a significant effect on trade flows. The study also shows that economies unaffected by BSE may have benefited from an increase in trade hence the loss to affected countries is not an actual net loss to the global economy but a shift in trading patterns. (A6)
East Africa	Following an outbreak of **Rift Valley Fever** in East Africa which led to an export ban by Saudi Arabia and other Gulf countries on livestock products from Ethiopia, the costs of the ban on Ethiopia’s main exporting region (Somali) and their distribution among different types of households, producers and traders are assessed using a CGE model. Results show that Somali’s GDP is reduced by 36% as a consequence of the ban. In addition, poor and better off producers experience total losses in value added of around 50% of their respective levels in a normal year.
Brazil	Due to the **FMD** outbreak in October 2005, Brazilian beef exports in 2005 grew at only 16%, half of the trade gains registered over the past five years. (A111d). According to latest data from the Brazilian Ministry of Agriculture on exports of beef meat in relation to the number of FMD cases during the 1990-2006 period, after the dramatic reduction in cases post 1998, exports increased from US$ 0.5 billion (the average annual value of exports during the 1990-1998 period) to US$ 3.5 billion in 2006. During the same period (particularly in more recent years), investment in the fight against diseases (both public and private funds) has increased significantly.
Uruguay	Uruguay beef exports more than doubled in volume (representing a 52% increase in value) after the OIE declared Uruguay officially **FMD**-free without vaccination in 1996. Access to the US market (which pays more than double the prices paid on the domestic market) provides Uruguay with additional income of around US$ 20 million per year. According to analysts, access to “Pacific Rim” markets would generate supplementary revenue of US$ 90 million per year. (A283)
Asia (Thailand, China)	Limitations on fresh/chilled/frozen products from **HPAI**-affected Asian exporters (in particular Thailand and the People’s Republic of China) caused a decline in Asian exports from 1.8 million tonnes in 2003 to less than 1 million tonnes in 2004, a loss of approximately US$ 1 billion of export earnings for the region. (A111d)

Country	**Impact**
Thailand	Prior to the **HPAI** outbreaks in late 2003, Thailand was the world's fourth largest poultry exporter. With approximately 40% of Thailand's estimated production of 1.5 million tonnes destined for export markets, market closures resulted in a 40% decline in export earnings in 2004, from an estimated US$ 1.1 billion to US$ 674 million. (A76)
Taipei China	The global pig meat market was affected by the **FMD** outbreak in Taipei China, when its pork exports, valued in 1996 at US$ 1.6 billion, fell to US$ 234 million in 1997. The result was a gain in access for some of its major competitors into Taipei China's previous export markets. (A111d)

(a) More extensive information on these countries can be found in the case studies

Source: compiled by Agra CEAS Consulting

Although there is no uniform pattern of the rate at which demand for the affected products and prices / trade at world level recover, it appears that zoonotic diseases such HPAI and BSE have longer lasting effects than diseases of less public health concern (such as FMD). From the experience of previous outbreaks, it appears that changing consumption and trade patterns related to zoonotic animal diseases tend to recover within two years.

c) Impact on sector's restructuring

As already discussed, animal diseases can have profound effects on a country's livestock industry structure and outlook.

Evidence suggests than in many cases the HPAI crisis has tended to accelerate the sectoral restructuring trend already under way in SE Asia. For example, in the case of Vietnam, while all poultry stakeholders have suffered in the short term from AI and the ensuing collapse in demand for poultry meat and eggs, the longer-term restructuring of the industry already under way – especially in and around big urban centres – has created a divergence in their future prospects. Farmers in Sectors 4 and 3 continue facing weaker demand in rural areas and an urban market that prohibits their produce (this would affect particularly the more commercially oriented sector 3), while commercial producers in Sectors 1 and 2 face better growth prospects as the market for "certified" poultry grows and consumers become more accustomed to processed products (A9).

d) Impact on upstream/downstream sectors

In addition to the above, a range of negative impacts prevail in the sectors upstream/downstream from livestock production as such. Amongst these, we distinguish the impact on the feed sector which is most documented by literature. The various HPAI crises, for example, have caused demand for feed to drop substantially in the EU-25, in Asia and in Africa, affecting the feed sector even in all countries that were important suppliers of feed inputs (**Table 9**). The latest simulations of the FAO model indicate that, with lower meat production pushing down grain and protein feed consumption, this may result in price drops[89] of 3% in the event of a global consumption shock due to AI (assuming a 10% shift in global consumption away from poultry) (A283).

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[89] However, this should be compensated by the increase in cereal prices because of the increasing demand for this raw material from the growth of the bio-fuel sector.

In the case of HPAI outbreaks, the available evidence also indicates that demand for chicks has fallen substantially suggesting longer-term dramatic effects on the sector's productive capacity and restructuring (as discussed above). As the experience of these outbreaks is relatively recent, it is not clear whether and how long the sector would take to recover to pre-outbreak production volumes.

There is also an effect on employment, which appears to be determined by the degree of commercialisation and industrialisation in the sector. For example, following the Asian HPAI crisis, countries whose poultry sectors are less industrialised like Lao PDR and Cambodia had a small loss of jobs, compared to Indonesia which has a considerable share of commercial systems 1 and 2.

Table 9 Ripple effects: selected examples of the impact on upstream/downstream industries

Country	**Impact**
Feed sector	
global	Since 2003, the global decrease in the demand for poultry products following **HPAI** appears to have affected the demand and prices for feed grains and oilseeds on world markets, although these markets are now thought to be recovering (source: Feedinfo 2006). (A295)
Vietnam (a)	The **AI** outbreaks have had a sharp effect on feed manufacturers, particularly those selling to semi-commercial producers. For instance, one major manufacturer reported a drop of 90% in feed production while another reported a drop of 60-70%. The cost of commercial feed accounts for up to 70% of the cost of raising industrial chicken, and Vietnam's poultry sector normally consumes an estimated 8-10 mt/year of complete feed, nearly all of which is directed toward semi-commercial and industrial farms. (A9)
Indonesia	In Indonesia, where half the provinces were infected with **AI** and 16.2 million birds died/were culled (excluding backyard farming), the demand for poultry feed was estimated to be reduced by 45%. (A91, A76)
Nigeria (a)	Following the **HPAI** outbreaks in Nigeria in early 2006, poultry feed sales dropped by 82%, and only 43% recovery (to pre-outbreak levels) had been attained by May 2006. Even in non-affected farms, following a 45% drop in the flock size (as farmers were cutting down flocks due to lack if funds to feed the birds), the level of feed usage declined by 55%. The loss to feed mills is estimated at about N 60.5 million ($0.5 million), on the basis of average feed consumption per bird (0.135 kg per day) and assuming it takes about seven months for the feed mills to fully recover from the shock at a constant rate; this translates to a 3.5 month volume of feeds (the average price per ton of feed is about N 48,000). (A293)
Benin	Maize prices are reported to have gone down because the demand from large-scale Nigerian poultry producers for maize feeds has been drastically reduced, following the **HPAI** outbreaks in neighbouring Nigeria. (A291)
EU-25	The European poultry feed industry, which has a turnover of about US$ 42 billion, has been hit by the **AI** crisis, with a 40% reduction in demand for poultry feed in some EU countries (A292).

Country	Impact
US	In the US, where 62% of oilseed and cereal production is destined for animal feed, an **epizootic** that would reduce livestock production by 10% would immediately result in the loss of 418,000 jobs, a surplus of 18.4 million tonnes of cereal and oilseed crops, a 10% drop in global market prices, and crises in other producer countries. (A292)
Other inputs: demand for chicks	
Indonesia	The drastic fall in demand and prices which was caused by the **HPAI** outbreaks in early 2004 had consequences for the producers of hatching eggs and day-old chicken. The demand for day-old chicks in the infected areas decreased by 58% for broilers and 40% for layers. Overall, the weekly supply of day-old chicks fell by 17.5% for broilers and 25% for layers. According to data from the Indonesian Poultry information Centre, within 1-2 months from the outbreak, sales of broilers fell from around 21 million per week to 14 million, while prices fell from Rupia 2200 per day-old chick to as low as Rupia 200. (A16, A76, A91)
Brazil	In Brazil, where 30% of poultry production is for export, the price of a day-old chick – an early indicator of a possible change in production – is reported to have fallen by 50% following global reports on **HPAI**. Even through the country is not infected, market uncertainties and price drops have prompted larger producers to cut their production by 15% this year (2006), thus affecting the country's export outlook (A292).
Wholesale markets/traders	
Vietnam (a)	The reorganisation of HCMC's chicken and egg production following the **HPAI** outbreaks (and the need to ensure product safety) led to a decline in the number of wholesale egg markets from 134 to 75, while the number of poultry markets fell from 1,550 to 7 (excluding supermarkets). (A9)
Nigeria (a)	Associated businesses such as those trading in poultry products are estimated to have lost close to N 61.7 million ($0.5 million): this is estimated as the 10% of the farm gate price of the number of birds that were either culled or dead as a result of the **HPAI**. One live chicken sellers' association (Abubakar Rimi Market in Kano, reputed to be the largest local chicken market in Nigeria), claimed that their sales dropped from 10,000 birds to only 1,000 birds per day in February/March 2006. The price also crashed from N350 to N150 per bird during the crisis. Similar experiences were reported in other markets. (A293)
Catering sector	
Nigeria (a)	A sharp drop by 81% was reported in sales in restaurants, fast food business outlets, roadside roasted chicken sellers and egg sellers within 2 weeks following the announcement of **HPAI** outbreaks (February 2006), which by May 2006 had only recovered to 67.7% of the pre-outbreak sales. (A293)

(a) More extensive information on the costs in these countries can be found in the case studies

Source: compiled by Agra CEAS Consulting

4.3.3.2. Spill-over effects

Tourism and services appear to be the two other sectors that are most severely affected by disease outbreaks. The extent to which this will have a significant macro-economic impact will depend on the contribution of these sectors to the national economy. In countries where these two sectors make a major contribution, as was the case for example with HPAI in parts of SE Asia, the impact can be devastating. (A12).

In the United Kingdom, the adverse impact of FMD on tourism and leisure totalled US$49 billion because of bans on access to rural areas, representing more than half the total cost of the disease (based on FAO, 2002 data). Similarly, indirect costs in Ireland, including spill-over effects, are estimated at 95% of the total US$5 billion loss incurred in 4 months only (**Table 6**). Significant impacts for the tourism and services sectors were also found in a 2002 Canadian simulation of the impact of a potential FMD outbreak (A112).

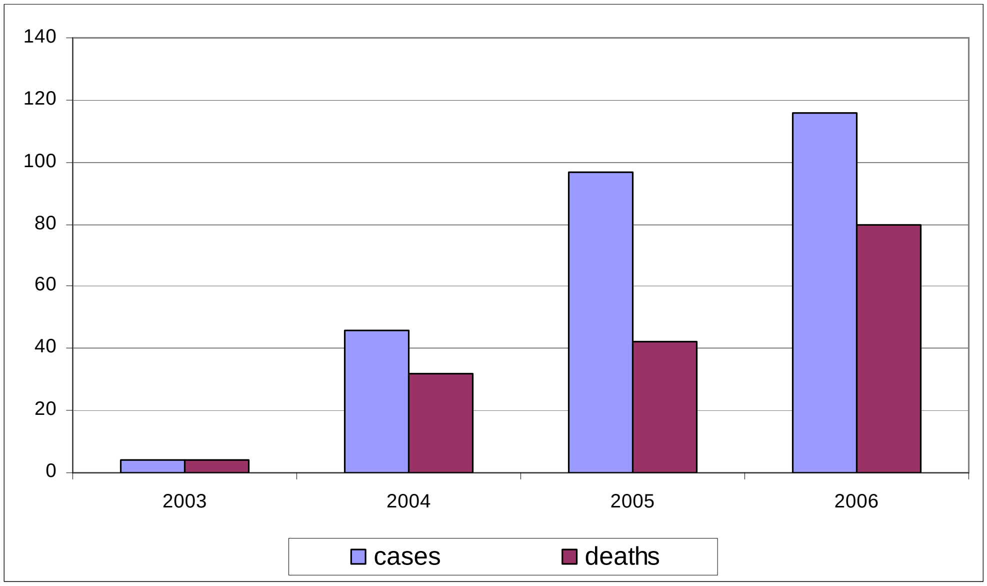
It is noted that similar diversion effects to those evident in trade may take place in the case of tourism and services. From studies looking at the effects on tourism in the UK during the 2001 FMD epidemic, there appears to be significant transfer of lost regional tourism revenue to other regions' tourism (certain studies argue that up to 75% transfers may have occurred, e.g. A249). It is plausible that such impacts may have occurred between countries or even between regions.

4.3.3.3. Wider society

The most obvious economic losses of a potential human pandemic are a shrinking and less productive workforce. Experts concede that, in the event of a pandemic, the losses could be as severe as ten times greater than all the other losses combined.

According to the latest data by the WHO, by 3 February 2007 a total 271 human cases of H5N1 had been reported, causing a total 165 deaths. This represents a case-fatality rate of 61%. Of concern to experts has been the persistence of the disease and the growing number of cases/deaths since the first outbreak in 2003 (**Figure 8**).

Figure 8 Cumulative global number of AI/H5N1 human cases and deaths, 2003-2006



Source: WHO (includes only laboratory-confirmed cases)

All of the confirmed human cases and deaths were in developing countries (**Figure 9** and **Figure 10**). Vietnam and Indonesia account for two thirds of the fatalities. The countries with the highest incidence tend to have the highest concentration of human and poultry population in the developing world, pointing to the increased risk posed by this factor. For example, in Lao PDR and Cambodia the total number of poultry losses and human fatalities was low. Apart from the smaller population of the two countries, a factor believed to have contributed to the lower losses are the low human/poultry population densities which provide less favourable conditions for the H5N1 virus to establish itself and spread (A91).

Figure 9 Cumulative number of AI/H5N1 human cases by country, 2003-to date

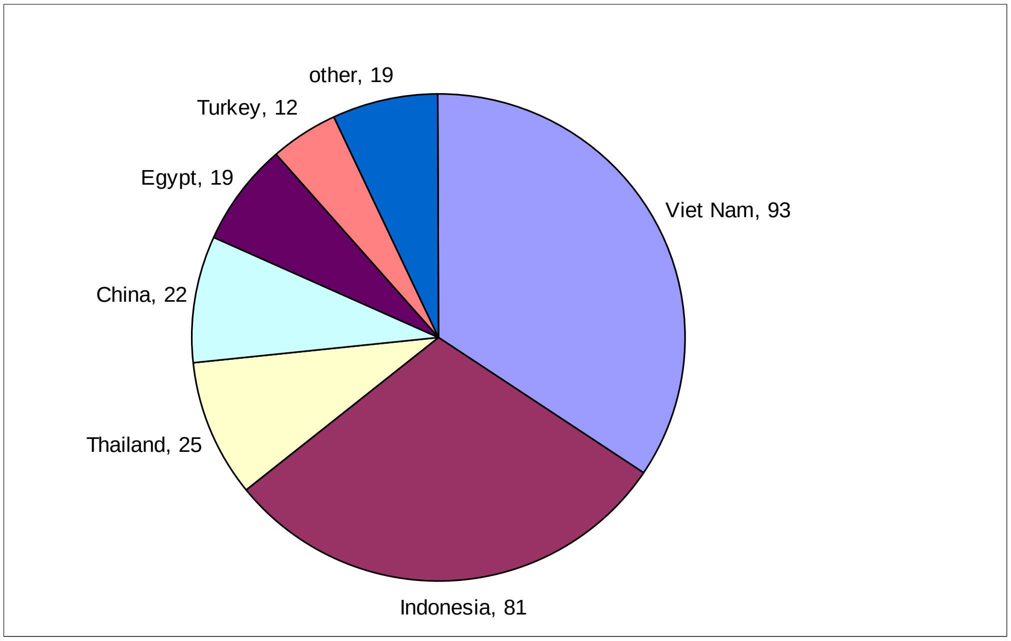
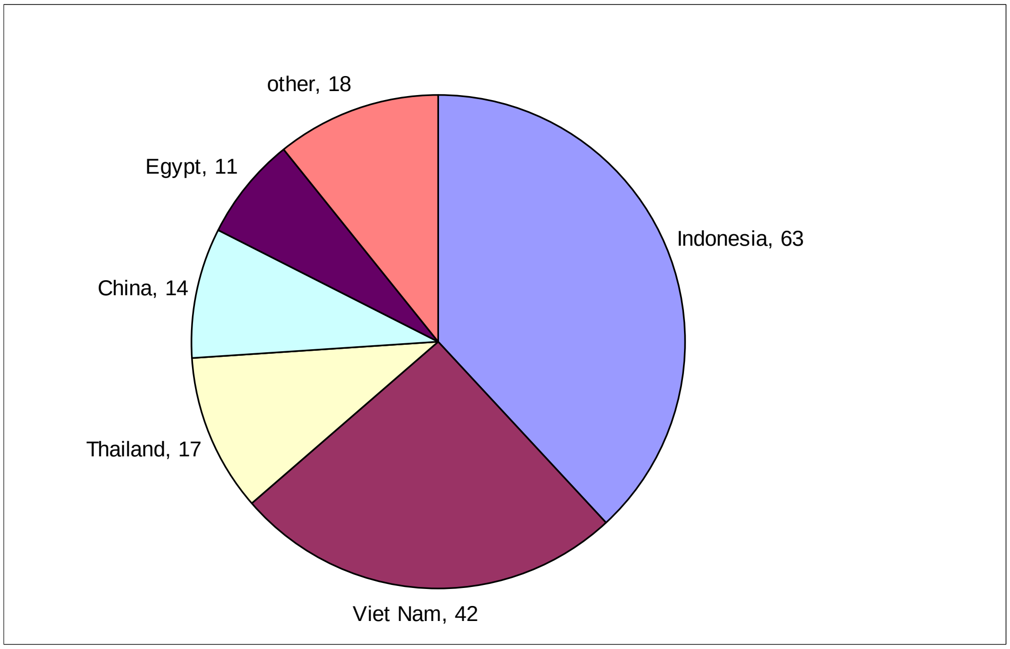


Figure 10 Cumulative number of AI/H5N1 human deaths by country, 2003-to date



'other' includes: Cambodia, Azerbaijan, Turkey, Iraq, Nigeria

Source: WHO, 3 February 2007

To assess the potential impact of a human pandemic caused by a likely mutation of the HPAI H5N1 virus to humans, the literature draws extensively on the three most documented cases of human flu in the 20th century as well as the most recent experience of a human pandemic scare -- the SE Asian severe acute respiratory syndrome (SARS). Latest estimates indicate that the "Spanish" flu outbreak of 1918 could have been responsible for the deaths of 50 million people, or 2.5% of the population of the time (A292). SARS revealed the scale and speed of the consumer/tourist response to even a limited outbreak: Asia's loss in regional GDP was US$18 billion in 2003 or 0.6 percentage points of the GDP growth rate in a region otherwise described as a booming economy[90] (ADB estimates, A198).

A problem with this analysis is that pandemics behave highly unpredictably, which explains why during previous pandemics great variations were seen in mortality, severity of illness, and patterns of spread. The mortality of the previous century's three pandemics varied enormously, from less than 1 million to some 50 million deaths. One consistent feature reported in all cases, nonetheless, has been the rapid surge in the number of fatalities and their exponential increase over a very brief time, often measured in weeks.

Best-case scenarios (WHO), modelled on the mild pandemic of 1968, project global excess deaths in the range 2 million to 7.4 million. Other estimates that factor in a more virulent virus, similar to that responsible for the deadly 1918 pandemic, estimate much higher numbers of deaths. Both scenarios are scientifically valid (A261). The differences arise from assumptions about the inherent virulence of the virus, which past experience has shown to vary greatly. In the final analysis, it is impossible to predict with any accuracy the impact that the next pandemic will have. However, all estimates, from the best-case to the worst-case scenario, suggest that losses would be very extensive.

Recent econometric modelling based mainly on demographic data from countries of the Asia Pacific region[91] suggests that a global influenza pandemic will have potentially large and disparate macro-economic consequences. Depending on the severity and duration of the pandemic, it may cost the world 1.4 to 142.2 million lives, causing global GDP to fall - at least temporarily - by 0.8% to 12.6% which represents a loss of some US$330 billion to $US 4.4 trillion (A10).

Based on the SARS experience in Southeast Asia, the World Bank estimates that an avian influenza pandemic could lead to a 2% drop in world GDP and cost the world economy US$ 800 billion in one year (all losses including wider society morbidity and mortality) (A292)[92].

Recent ADB-ERD simulations (A90, A290) estimate the potential economic impact of an avian flu pandemic on 9 Asian countries at $113 billion (or 2.6% of their 2006 GDP), under a scenario of a mild outbreak (infection rate: 20%; population mortality rate: 0.1%; equivalent to 3 million people dead) with limited demand shocks (serious impact for 2 quarters of the year). Exporting economies such as Singapore, Thailand, Malaysia and Chine would be particularly affected. In the second scenario, when the impact is of longer duration (4 quarters) and demand shocks spread to the rest of the world, the estimated loss to the region could be $283 billion (or 6.5% of GDP), resulting in cutback in Asia's GDP growth to 0.1% (global GDP could also contract by 0.6%).

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[90] Much of the loss was linked to a rapid decline in travel and tourism, a fast growing sector now worth some US$ 1.5 trillion per year, nearly 4% of global GDP. Losses also rose sharply in leisure industries and retailing.

[91] Based on an Asia Pacific model consisting of 20 countries and 6 economic sectors.

[92] Earlier (1999) estimates for the US alone, put the cost of a flu pandemic at US$100 to US$200 million (in present value) depending on the assumptions (A5). The World Bank extrapolates from these figures to other developed countries coming to a global loss of US$ 500 million in present value (A185). It is emphasised, however, that these costs do not include losses in the developing countries and that it would be inappropriate to make a simple extrapolation from studies of rich developed countries to relatively poor developing countries where health systems are less developed and mortality could be much higher.

According to analysis by Oxford Economic Forecasting, a flu outbreak would almost inevitably be global and this not only multiplies the losses around the world but would add a large “trade multiplier effect” as well, so that the costs would be more than a simple multiple of SARS. A likely minimum economic cost of a serious global pandemic flu outbreak is estimated at 1% of world GDP or about $400billion. Under reasonable assumptions over the duration, attack rates and mortality rates of a flu pandemic, the annual cost could easily rise to more than 5% of world GDP, representing losses of about $2 trillion per annum. (A210)

It is possible to quantify the impact of zoonotic diseases on human health in terms of disability adjusted life years (DALYs[93]), as is currently done by the WHO for a range of diseases of zoonotic potential. From such an analysis useful conclusions can be drawn with regard to the cost-effectiveness of using different control strategies to avert the burden of diseases. However, the paucity of basic epidemiological information on zoonotic diseases is a major constraint to making quantitative assessments of their relative importance, in public health terms, in different areas of the developing world (A19).

Our analysis in this section leads us to the following conclusions:

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[93] The DALY takes into account both premature death and morbidity/disability and it considers the years of life lost (YLLs) and the years of life lived with disability (YLDs). It is extensively used to evaluate the cost-effectiveness of medical interventions to improve health so as to determine the priority of the different actions and the use of public health budgets (A49).

Literature review: economic impact of animal diseases

The economic costs of major TADs have been hitherto largely under-studied, particularly in developing/transition countries (with the notable exception of some studies of CBPP, RVF and rinderpest in African countries). In recent years, following major outbreaks (FMD, HPAI) and mounting concern worldwide on the potential repercussions of such diseases on farmers, the rural community and the wider economy, more examples of such analysis have started to emerge also in other regions of the world.

Existing literature on this subject is relatively scattered, and concentrates mostly on particular diseases, countries, and types of impact, within a certain time period. There are hardly any examples of systematic analysis undertaken at a regional level and across the broad spectrum of types of impact followed by our study.

While there is wide consensus in the available literature that indirect or longer term impacts (such as loss of consumer confidence or the effects on trade and tourism) are far greater than the direct or shorter term impacts (loss of poultry value, consequential on-farm losses), as proven to be the case in the particular case of the studies examined here, there is a need for determining on a global worldwide level the extent and relative importance of the various impacts. We have sought to address this gap by estimating these impacts for individual countries and on a world scale (section 6).

Determining the relative scale of the range of impacts, and therefore of the potential benefits involved, is essential for policy-making. It enables policy-makers to identify the potential benefits of improved prevention and control policies in order to define the relative cost-benefit of alternative options, so as to concentrate on appropriate and proportionate policy measures and investment decisions in each case (disease, country, region).

4.4. Comparison of prevention versus outbreak costs: cost-benefit analysis

The shortcomings of a CBA (cost-benefit analysis) approach, notably in terms of data requirements and the dependence on the underlying scenarios/assumptions, have been discussed elsewhere in this report (sections 3.7 and 4). This is hardly surprising, given that even in the broader field of disaster management there are very few examples of CBA analysis at present (A138).

Due to these constraints, there are relatively few examples of thorough cost-benefit analysis in the reviewed literature. Selected examples are presented in **Table 10**.

The majority of the studies reviewed deal with a more tangible and measurable type of benefit, the trade impact. Overwhelmingly, the available research supports the thesis that improved prevention and control (including through the improvement in VS) contribute to significant gains in trade, which justify the investment. This is particularly so in the case of FMD, but there are important such benefits also in the case of HPAI. In some cases (e.g. A141) the benefit in terms of productivity gains, although significant, is not a sufficient argument on its own in macro-economic terms to justify the investment.

It is noted that a number of other studies (discussed elsewhere in this Report) explore the various potential benefits of improved prevention in a less rigid methodological framework. Such analysis can be based on surveys, case studies, and official or anecdotal evidence. The explored benefits include *inter alia* trade effects, productivity gains, poverty alleviation and social welfare implications. In the vast majority of cases, the findings suggest there are significant benefits.

Table 10 Cost-benefit of improved prevention and control: selected examples

Country	**Impact**
Latin America (a)	An **analysis of the benefit of improvements to animal health** in Latin America. *This research is currently in progress.* (A141): Scenarios: Compares the 'Current Situation' (CS) with an 'Improved Situation' (IS). The CS is described in terms of expenditure per animal equivalent (AE) which ranges from US $ 1.5 in Argentina, to US $ 0.7 in Brazil and US $ 0.4 –0.50 in Paraguay and Peru. Scenario 1 envisages an increase in expenditure per animal equivalent to 50 % of the difference between average expenditure in Brazil/Argentina compared to Paraguay /Peru, which equates to an increase of US $0.32 per animal; this would result in increased expenditure of some $ 18 million in Argentina and $ 3.5 million per year in Bolivia. Scenario 2 is based on the number of vets and average 'salary'; the IS here refers to moving upwards in terms of costs to a range between US $ 75-146 million. Results: Preliminary estimates are presented in terms of Net Present Value (NPV) and economic surplus (producer and consumer surplus). The conclusion is that trade impacts are a very important benefit: for every single unit of expenditure welfare gain ranges from 11 to 22 units. Given assumptions on removal of trade barriers, continued world economic and meat demand growth, growth in productivity in other regions etc., 100% of impact would only be achieved by year 15. **An injection over 15 years of some additional US $157 million per year, which has an internal rate of return of 50%, generates a NPV of US $1.9 billion** or US$ 3 per head of population or US $4.2 per animal equivalent. On the other hand, productivity gains alone, although significant, are not considered a sufficient economic justification for investment.
Philippines	Scenarios: Maintaining **FMD** control at current levels with continued presence of the disease, compared to a publicly funded programme achieving eradication by 2005 (policy objective at the time of the study), 2007 and 2010. Baseline is 1997, the beginning of the national FMD control programme when the annual economic cost was highest, peaking at over US$14 million, due primarily to extensive vaccination. This is projected to rise gradually from year 2000 levels. Approximately a third of the total each year, or an average US$1.1 million, represents public control costs for prevention, mostly related to surveillance and monitoring activities. An additional US$0.3 million (9%) is spent to contain the persistent FMD outbreaks. Commercial pig producers support the largest share of the cost, US$1.7 million (54%), for preventive vaccination. The value of production losses suffered by producers due to FMD is limited to an estimated US$0.1 million. Results: Under varying assumptions regarding the development of exports of livestock products following eradication, **estimated benefit-cost ratios for the investment in eradication range from 1.6 (2010, no exports) to 12 (2005, export gain of 10,000 tonnes of low-value and high-value livestock products)**. This indicates eradication is the most economically viable public investment. The commercial pig sector is estimated to capture 84% of the benefits generated by the investment, versus 4% by backyard farmers. (A233)

Country	**Impact**
Thailand	Scenarios: Improved vaccination coverage for **FMD** (to reduce productivity losses), compared to eventual eradication of FMD. Results: the economic return to the high expenditure incurred in FMD control could be achieved in the short term if greater international trade in pork products was made possible and higher export prices than those in the domestic market could be attained. **If FMD were to be eradicated from Thailand by 2010, the eradication would be economically viable, even without exports, with a benefit-cost ratio of 3.7**. **If eradication is achieved by 2015 without additional exports, the benefit-cost ratio becomes 2 and by 2020 it would be 1.2. If additional exports are achieved, the justification for eradication becomes stronger with a benefit-cost ratio of up to 15:1.** (A124)
UK	Scenarios: Four broad control strategies for **FMD** are examined. a) Culling of infected premises and epidemiologically linked holdings; b) Strategy (a) plus contiguous cull; c) Strategy (a) plus vaccination of cattle only; d) Strategy (a) plus vaccination of cattle and sheep. Results: The findings suggest that there are a large number of parameters that influence the size and total cost of an outbreak and hence there is no generally applicable lowest cost control strategy. The predicted mean total outbreak cost (net of inter-sectoral transfers, e.g. from the affected regions' tourism industry to other regions) varies between approximately £20 million and £440 million. This compares with the estimated cost of the 2001 outbreak of approximately £3,800 million on a comparable basis (£3,100 million for the livestock industry, food chain and central Government costs; and £700 million for the estimated lost tourism sector “value added” not transferred elsewhere in the economy). (A249)
Africa	Cost and benefit analysis of the **CBPP** control program in twelve sub-Saharan African countries (Burkina Faso, Chad, Cote d’Ivoire, Ethiopia, Ghana, Guinea, Kenya, Mali, Mauritania, Niger, Tanzania and Uganda): Scenarios: Compares the economic cost of CBPP without control’ program for CBPP and the benefits of its control. The value of the losses of CBPP due to morbidity and mortality in all the twelve sub-Saharan African countries concerned was estimated at 30.1 million Euros (an average of 2.5 million Euros per country), which represents the 66.7% of the total economic cost of CBPP estimated at 44.8 million Euros (an average cost of 3.7 million Euros per country). The cost of the disease control (estimated at 14,7 million Euros) includes the cost of vaccination (78%) and the cost of treatment (22%). Results: these estimates suggest that **by investing 14.7 million Euros to control CBPP in the countries concerned, a loss of 30 million Euros will be avoided. This will lead to a net benefit of 15.4 million Euros; equivalent to a net benefit of 1.3 million Euros per country** Benefit-cost analysis revealed that CBPP control using vaccination and antibiotic treatment is economically beneficial as an overall benefit-cot ratio of 1.94 (ranged from 1.61 in Chad to 2.56 in Kenya). (A186)
Mali	Preliminary simulations from a cost-benefit analysis of the strengthening of VS and in particular of epidemiological surveillance in Mali demonstrated that a reduction by 1% of the mortality rate of bovines and by 2% of the mortality rate of small ruminants would allow an increase in annual production of 14,000 tonnes of meat, which represents a retail value of about US$ 28.9 million a year. (Analysis quoted in A110)

(a) More extensive information on the costs/benefits for Argentina can be found in the case study

Source: compiled by Agra CEAS Consulting

Certain observations can be made on the results of the available studies.

1. Firstly, as discussed elsewhere, these results should be interpreted with caution due to the specificities of the methodology, coverage and scenarios/assumptions on which these studies are based. It is therefore important that results are always analysed in the context covered by the specific study. In all cases (including the present study, as outlined in section 6), the estimates provided should best be seen in relative terms, as orders of magnitude.

   When, for example, estimating the benefits in terms of market access that can be achieved with increased funding on veterinary services and control measures, it should be noted that results will always depend not only on the volume of funds provided but also on the efficiency with which these are applied.

2. Secondly, caution should be taken in extrapolating from the findings of a specific case study country/ies to the regional/global level. This is not only because the various studies use specific scenarios and assumptions, as discussed in the previous point, but also because they cover situations (at an economic, policy, institutional, epidemiological level) which may be specific to the country/ies under review.

   This is the case both for FMD and HPAI, which both as diseases and in terms of potential economic impacts present strong regional specificities.

   For example, in the case of FMD in SE Asian countries, a number of factors influence the capacity of each country to achieve control and eradication (A124, A182, A233). First, the feasibility of effectively controlling and eradicating the disease varies considerably depending on whether the disease is endemic (as is the case for most of SE Asia); the type of farming systems primarily affected (village systems in Thailand/Laos, commercial system accounts for 2/3 of pig farmers in the Philippines); and the risk of re-introduction (important movement corridors in Thailand/Laos, islands in the Philippines). Secondly, the presence of a significant commercial livestock sector is a key differentiating factor: the constant threat of FMD requires commercial producers to incur high costs for preventive measures and likewise influences governments to invest in publicly funded FMD control programmes in the small-scale and village sectors, while a strong commercial sector also contributes pressure to develop export trade which becomes an important driving force for eradication. These findings have clear implications for regional FMD control efforts: given the diversity in the economic impacts of FMD and in national capacities for control of the disease, regional freedom in South-East Asia is considered highly unlikely in the short to medium term[94] (A233). By contrast, in the case of the South American region, FMD eradication is pursued as a regional objective, given the strong regional relevance of the disease and the significant global export potential of the region as a whole (discussed further in the case study on Argentina below).

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[94] According to the latest OIE Resolution No. XXVI of 26 May 2006, the only SE Asian countries recognised as "FMD-free without vaccination" are Indonesia and Singapore, and zones of Malaysia and the Philippines.

In the case of HPAI, similar factors enter into play in the fight against the disease. In particular, the nature of the disease (for example, now acknowledged endemic in many parts of SE Asia), the state of VS preparedness in each country, and the existing farming structures (e.g. geographically highly dispersed poultry population) affect the needs and costs of establishing effective surveillance, biosecurity and improving prevention and control in each country.

Our analysis in this section leads us to the following conclusions:

Literature review: comparison of prevention to outbreak costs

From the reviewed literature, in relatively few cases the analysis on the benefits of improved animal disease prevention and control can be defined as a full classical CBA. The majority of the reviewed studies consider the most measurable types of benefit, notably trade impacts. They also tend to focus on specific components of prevention and control systems, specific diseases, countries (or even regions within countries), specific epidemiological conditions in which prevention and control measures may be applied, specific types of benefit and specific scenarios and assumptions under which the benefits may be derived.

In all the cases reviewed here (Table 10), such studies conclude that the significant benefits that accrue from improved prevention and control measures outweigh the cost of investment. For example:

- **In Latin America, an investment on improvements to animal health of some additional US$ 157 million per year over 15 years generates a Net Present Value of US$ 1.9 billion. In Africa, an investment of Euro 14.7 to control CBPP could save Euro 30 million in losses from morbidity/mortality, leading to a net benefit of Euro 15.4 million.**
- **In Asia (Philippines, Thailand), eradication programmes for FMD have been assessed to provide benefits in terms of improved trade and market access that are several times worth the investment (the extent of the benefit depending on the underlying assumptions).**

Results of this type of analysis depend heavily on the underlying scenarios/assumptions, and the implication of this is that a) they need to be interpreted within the context in which they have been generated; and b) comparison and extrapolations from individual case studies are constrained and should be treated with caution.

5. Case studies

5.1. Argentina (South America)

5.1.1. Background

5.1.1.1. Importance of livestock sector to the economy

Argentina's stock of cattle, sheep, goats and pigs totals over 68 million, which represents 1.6% of world stocks (cattle: 1.6%, sheep: 1.2%). Beef production accounts for 5% world volume. In 2004, the livestock sector accounted for 2.8% of the country's GDP and 31% of the agricultural GDP.

The livestock sector is an important generator of export income; agriculture has led the export-driven recovery of the Argentinean economy following the crisis of 2001. Argentina is one of the world's top beef exporters (6.6% of world exports by volume and 5% by value in 2004), and a significant dairy exporter (0.5% and 1% respectively). In 2004, beef exports brought over US$1 billion and dairy another US$0.5 billion, together accounting for 11.5% of Argentina's total export earnings that year. By quantity and value the EU (Germany) is the biggest importer of Argentinean fresh beef (and Russia of frozen). Processed meat and dairy products account for the largest share of North American (US and Canadian) agricultural imports from Argentina.

An estimated 45% of Argentina's population lives in rural areas (above the average for Latin America), and a significant proportion of these rely on livestock for income. Nearly 40% of rural households are in extreme poverty (compared to just over 30% in urban areas): this is estimated to affect more than 200,000 rural households, most of them in dispersed areas.

Despite its significance, the beef sector has experienced long-term stagnation in production, exports, and by all available productivity measures, although there has been some recovery in recent years. Between 1961 and 2002, land productivity in livestock grew only 50% in Argentina (compared to 150% in Chile and 300% in Brazil).

Another key weakness of the Argentinean livestock sector is the poor slaughtering and meat processing facilities. According to the WB, equipment complying with international standards can serve at present only 25% of output, estimated at 13.5 million tons per year. Uniformity and quality is a requisite to improve beef production and increase exports and has an effect on prices. Poor meat processing is estimated to result in price losses in processed products of approximately 15%. In an industry whose output is valued at US$18.5 billion, lack of quality can result in losses of over US$2.7 billion per year (A260).

A classification of Argentina's socio-economic position in the world, as carried out for the purposes of this study, can be found in **Annex 3**.

5.1.1.2. Key AH problem areas

Argentina was selected as a representative case study in the Americas because of the FMD relevance. Due to the fact that FMD, particularly in South America, has proven to be a challenge not facing any one country alone, a regional approach is very important for addressing this animal health problem. Such an approach is increasingly being taken by the various countries in the region as will be discussed in the following sections. Therefore, Argentina is being presented here not only on its own merit but also in the context of its role in the South American region.

FMD is a recurrent disease in South America and appears to be endemic in Bolivia, Ecuador and Venezuela. The disease occurs sporadically in Argentina, Paraguay, Uruguay, Peru, Colombia and Brazil. In particular, FMD serotypes O, A, and C are known to occur in the affected regions. The general FMD situation in South America significantly improved during the 1990s, due both to regional initiatives[95] and efforts made by individual countries (**Figure 12**).

Since 2000, however, a number of countries have reported new and significant outbreaks including Argentina, Brazil, Paraguay and Uruguay. The evolution of FMD outbreaks in Argentina during 1990-2005 closely mirrors the general trend in South America as depicted in **Figure 11**. This situation has resulted in major trading setbacks for the region.

A significant part of Central and South America are currently recognised as FMD-free without or with vaccination, but some of the countries that are not recognised have significant export potential, including Argentina and Brazil for which only certain zones are recognised FMD-free[96]. The impact of FMD, particularly in Brazil and Argentina, has global implications since these are major world exporters of meat. In the case of Argentina, when the first outbreak occurred in 2000, the country had only recently gained recognition from the OIE as being FMD-free without vaccination[97].

The OIE currently recognises two exporting zones in Argentina with respect to FMD status. The zone situated south of the 42° parallel (South Patagonia) is recognised as "FMD-free without vaccination", while the zone situated north of the 42° parallel is recognised as "FMD-free with vaccination"[98]. The latest outbreak in Argentina occurred in early February 2006 in the province of Corrientes, following which Argentina temporarily lost its status, but the impact appears to have been minimal[99].

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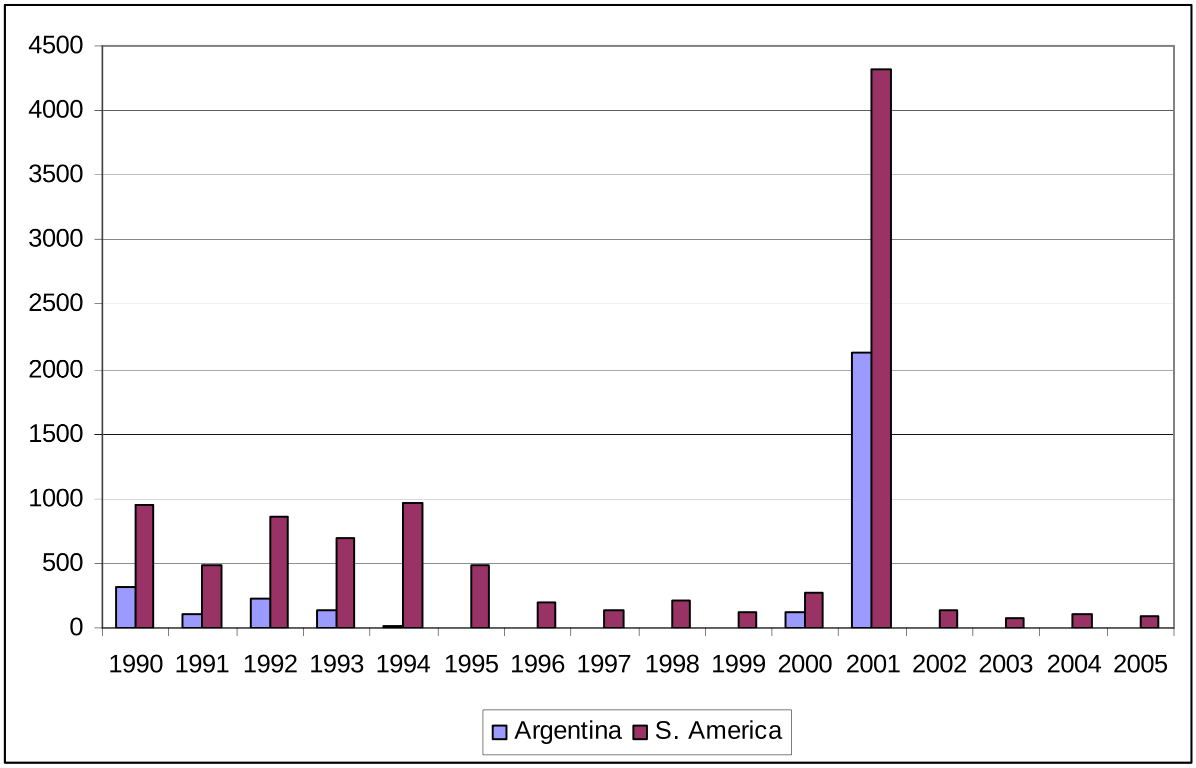
[95] Since 1987, an Hemispheric Plan for the Eradication of FMD (PHEFA) has been put in place by the countries of South America. Clinical cases of FMD decreased considerably throughout the continent: during the early 1990s national laboratories diagnosed an average of 766 cases per year in South America, but by the late 1990s the continent-wide average had fallen to 130. In 1999, clinical signs of FMD were absent in 60% of all cattle on the continent (which represented 41% of all South American herds and covered 60% of the continent's geographical area) (A160).

[96] According to data from PANAFTOSA/PAHO-WHO, OIE FMD zoning in South America covered as at the end of 2005 78% of the total cattle population (which represented 60% of all South American herds and covered 53% of the continent's geographical area). [PANAFTOSA: Pan American FMD Centre]

[97] In May 1997, Argentina achieved the classification of FMD free with vaccination, in accordance with Chapter 2.1.1 of the OIE Code. In May 2000, the status of FMD free without vaccination was achieved.

[98] For the various implications of vaccination see section 4.2.1.4.

Figure 11 FMD outbreaks: Argentina and South America (1990-2005) (a) (b)



(a) On the basis of reported outbreaks – FMD prevalence may be higher than the reported figures
(b) South America includes: Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Uruguay and Venezuela

Source: Country reports to PANAFTOSA/PAHO-WHO

As already discussed, FMD is a regional problem in South America, therefore maintaining the recognised FMD free status (without or with vaccination) remains a constant challenge for Argentina, as well as some of the other countries in the region, while the disease remains present in neighbouring countries or areas. FMD-free areas of countries which border infected areas/countries are at greater risk than before achieving disease-free status, especially if freedom is achieved without vaccination. This appears to be a persistent problem for Argentina as has been shown in previous outbreaks[100], emphasising the importance of strict and harmonised controls at source in all the countries of the region as well as of tight border controls and cross-border trade (A160, A172, A191). Both the re-emergence of the disease in 2000 and the more recent outbreak in Argentina's approved export zone in 2006 have been seen as warning signs that movement controls may not be adequately implemented (e.g. EU/SANCO-FVO Mission Report, A172; UK DEFRA analysis, 2006).

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[99] 'FMD free zone with vaccination' status for Argentina, as recognised by the International Committee of the OIE in terms of Resolution XX of 24 May 2005, was suspended with effect from 8 February 2006 (adopted by the International Committee of the OIE on 23 May 2006). Argentina reported it had eradicated the outbreak on 3 April 2006. The country responded to the outbreak through the stamping out of around 5,000 animals (mainly cattle). The trade impact has been minimal because most major markets (with the exception of Chile) only banned imports from Corrientes, a province which accounts for only 2% of Argentine beef exports.

More generally, it is argued that the continuous re-introduction of FMD into the Southern Cone countries of South America is the result of failure to sustain the continuing high levels of prevention and surveillance required to maintain FMD free status (A160, A260). For example, it appears that during the 2000-2001 FMD outbreaks in Argentina, few of the local committees previously established were still in operation[101] (A196). This is attributed both to the general economic and financial instability in the region (scarcity of funds puts pressure on governments to prioritise), and lack of institutional experience in the management of these programmes.

The funds committed by both the public and private sector in South America indicate that the significant commitment during the mid 1990s was somewhat relaxed by the late 1990s, when the FMD situation was considered largely resolved and governments therefore moved funds to other high-priority areas (**Figure 12**). Following the extent and the spread of the outbreaks in 2000 in a large area previously considered free of FMD (**Figure 11**), expenditure on FMD programmes picked up again in 2001, with a significantly increased contribution by the public sector.

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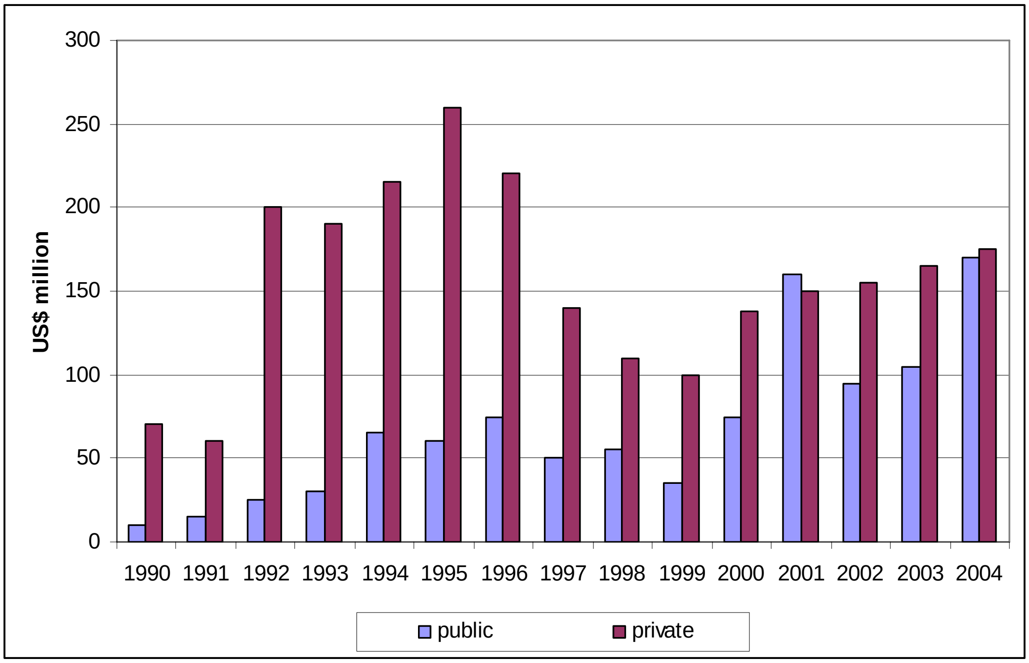
[100] The first reported incident in 2000 by Argentina was of the virus type A in a province on the northern border with Paraguay. Further investigations linked outbreaks in two other provinces to this initial report. By the time culling and carcass disposal had been completed, the veterinary services had detected 124 infected premises, 113 of which were type A virus. In 2001, all of the 2126 officially reported outbreaks were of the type A virus. A special control zone on the northern limit of the Patagonia area prevented the disease from spreading to the south of the country. The types and prevailing strains show that the Argentine problem is the problem of the region, thus, an isolated strategy will not produce long term results (SENASA, A259)

[101] These committees were established in previous outbreaks and played an important role in co-ordinating the response at national level.

Figure 12 Public and private funds committed to FMD programmes in South America, 1990-2004



Source: Country plans; PANAFTOSA/PAHO-WHO

5.1.1.3. AH services and institutional structures

During 1990-2004, the changes initiated under the national programmes appear to have contributed significantly to the strengthening of the veterinary services in Argentina (in common with most of the other South American countries) (A160). A review of the development of Argentina's competent authorities and structures, at national and regional level, during that period is contained in **Annex 2**. The relevant competent authority in Argentina is SENASA, the national service of livestock, plant health and food security, which operates under the Ministry of Agriculture and Food. Since the re-emergence of the disease in 2000-2001 SENASA has been restructured, and further restructuring plans are envisaged for the near future[102].

The EU's FVO reports that significant improvements were made in the structure and resources (trained staff and equipment) of SENASA and the other relevant bodies during 2000-2005, in successive missions which were undertaken by the FVO expert teams during that period to evaluate the controls in place over FMD (A172). Despite some shortcomings, the overall set-up of the FMD controls and institutional structures is described fairly positively, and the Argentinean authorities are seen as being responsive and taking measures to follow up on the recommendations made. Overall, the latest FVO report (2005) concludes that the control system in place guarantees that provisions of Community legislation on imports of meat of all species are generally complied with, although further improvements can be made in FMD control. The points on which emphasis is always placed are active/passive surveillance and border/movement controls, which by definition are the most sensitive links in the system given the regional epidemiological relevance of FMD.

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[102] An EU-financed (EuropeAid) programme to support the institutional strengthening of SENASA, of an estimated value of Euro 2.9 million, was launched in late 2006. The 3 year project has 3 components: a) support for the institutional redesign of SENASA; b) strengthening the control, surveillance and certification systems for the agri-food chain as a whole; and c) improving the data processing systems particularly for the traceability, prevention and control of health risks.

In its latest report on Argentina's agricultural sector, the World Bank also concludes that SENASA has a good technical capacity and has been able over the years to establish sound regulatory systems and processes, and that it is aware of its own deficiencies and striving to correct them (A260).

Eradication plans have been enacted since 1990 in Argentina, the most recent following the large outbreak in 2000-01[103]. The goal has always been the eradication of FMD from the national territory, allowing for international recognition of the country as FMD-free. The plans have included the strengthening of the national and regional structure with broad participation of all sectors; the limitation of viral circulation by means of systematic or strategic vaccination; control of livestock movement; stamping out or sanitary slaughtering under special circumstances; and epidemiological surveillance. The national FMD contingency plan has recently been under review, following *inter alia* FVO recommendations.

Mass vaccination during the 1990s has been an important component of Argentina's eradication plan. This was suspended in 1999, which led to part of the country gaining 'FMD-free without vaccination' status since 2000. However, systematic and strategic vaccination campaigns have been maintained to keep the country free of FMD (A172).

To address concerns over cross border transmission of the virus, a buffer zone programme started officially in 2001 (Resolutions 403/04, 446/04 and 748/04) with the objective of maintaining the country status achieved for FMD. It establishes a buffer zone along the border with Bolivia and Paraguay. This appears to provide efficient additional protection in this high risk area (A172c).

The only laboratory entitled to perform analyses related to field investigation of FMD in Argentina is the SENASA national reference laboratory in Martinez. This gained accreditation in 2006.

Animal registration/identification and animal health management systems are in operation (the latter was introduced in 2004), and these appear to have reinforced the traceability and control of animal movements (A172c).

At a regional level, during the last 20 years, Argentina has been part of the regional initiatives for the fight against FMD, including the Hemispheric Plan for the Eradication of FMD (PHEFA) established in 1987, and the new Hemispheric Plan for FMD (GIEFA) created in March 2004. GIEFA was created in the inter-American context[104] to deal with the few pockets of resisting FMD on the continent. The objective of GIEFA is to eradicate FMD from the Americas by 2010 through control and elimination of the disease from endemic areas and by protecting FMD free areas. To this end, in 2005 the GIEFA developed an Action Plan, which is to be complemented by national plans.

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[103] In 1990, Argentina started a two-phase eradication plan. The first phase lasted from 1990 until 1992 (control plan); the second phase ran from 1993 to 1997 (eradication plan). Following the 2000 re-emergence of the disease, Argentina's plan for FMD eradication was unveiled and implemented in April 2001 (SENASA Resolution No. 5, dated April 15, 2001).

One of the basic strategies of the new plan is to strengthen the infrastructure of national veterinary services. It appears that the previous programme (the PHEFA) contributed significantly to the improvements of veterinary services in almost all countries of the region, including Argentina.

5.1.2. Cost of prevention and control systems

As discussed above, significant public and private funds have been committed in the South American region in the context of the national plans. In total, some US$ 3.5 billion have been committed on the fight against FMD by South American countries during 1990-2004, of which the public sector has contributed roughly 30% and the private sector 70% (**Figure 12**). Over 75% of the mass vaccination undertaken by Argentina and other countries in the region was funded by the private sector (A196).

In 2001, although in the midst of extensive financial difficulties, Argentina's government assigned a budget close to US$ 60,000,000 in its latest plan to control FMD (SENASA Resolution 5/2001).

While a regional approach is increasingly being advocated to address FMD, the extent of the financial commitment on GIEFA is not clear as yet.

5.1.3. Costs of outbreaks

Argentina's FMD outbreaks have caused significant ripple effects in terms of trade losses in important export markets. As soon as the "FMD-free with vaccination" status was granted in May 2007, US and Canadian markets were opened to Argentine fresh beef (further gains were envisaged in Asian countries in anticipation of a sustained "FMD-free without vaccination" status). Following the FMD outbreak in 2000-01, the closure of foreign markets reduced export volume by 53% and export value by 65% within the first eight months of 2001 compared to the previous year. Beef exports fell from US$706 million in 2000 to US$267 million in 2001 (A260).

Additional losses were reported from lower livestock prices. The dairy industry was also affected because of reduced productivity per cow and restricted market access.

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[104] Created by PAHO-WHO (Pan American Health Organisation) and USDA in Houston Conference, with an initial 12 members (6 private and 6 public) and later expanded to include 4 new members (Paraguay, Bolivia, Ecuador and Venezuela).

5.1.4. Comparison of prevention versus outbreak costs

A review of the cost-benefit of improvements in Argentina's and other Latin American veterinarian systems was recently undertaken by the OIE Regional Representation/CEMA (A141) [105]. The review indicates that the cost of provision of veterinary services in Latin America is approximately US $ 300 million per year. This means each dollar spent on veterinary services covers a stock value of between US $280-300 per animal, in other words expenditure per year on official veterinary services equates to 0.3% of the value of the stock. Starting from the current situation as a baseline, the potential economic benefits from reduced animal disease incidence resulting from different scenarios of increased investment in veterinary services are explored. The current situation is described in terms of expenditure per animal equivalent, which ranges from US $ 1.5 in Argentina to US $ 0.4 – 0.50 in Paraguay and Peru and US $ 0.7 in Brazil. One scenario envisages an increase in the expenditure of US$ 0.32/animal equivalent. This would result in increased expenditure of US$ 18 million in Argentina.

Preliminary results, in the case of Argentina, indicate that productivity increases from a reduction in animal disease incidence would range from 5% to 15%, which (taking a value of US$ 0.8 per animal equivalent and attributing this to the increase in meat output) could generate revenue in Argentina of US$ 20 million. In terms of the potential trade impact, assuming a 20% price improvement (earlier research suggests that there could be up to 40% increase in Argentinean prices resulting from removal of FMD), Argentina could gain an additional 260,000 tonnes of exports. It is noted that the region as a whole could achieve total exports of 1.9 million tonnes (compared to present exports from these countries of 1.2 million tonnes) i.e. 60 % increase. It is concluded that the final outcome in terms of NPV and welfare gains justifies the investment.

Trade benefits in return to this type of investment are also expected by other experts, including the WB. It is noted that Uruguay, a country that has followed a very similar path to Argentina in improving animal health conditions during the 1990s and was declared "FMD-free without vaccination" by the OIE in May 1996, was able to gradually open up selective export markets in Europe, Asia, and North America, reaching a total of US$412 million in 2000 (A230).

In addition, there are poverty alleviation arguments in support of such investment. In its latest report on Argentina's agricultural sector, the WB recommends investing *inter alia* in SPS systems, as an effective way to help improving poverty conditions (A260).

More generally, the WB notes that Argentina's experience with FMD control demonstrates how a program based on a regionally concerted effort and strongly supported over a number of years with adequate legal, technical and financial means finds success, but reversal is still possible if support weakens. The same conclusion can be drawn also from the experience of other countries in the region such as Uruguay (A230) and Brazil (A175).

Our analysis in this section leads us to the following conclusions:

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[105] This research is currently in progress – results are preliminary. Further findings are presented in **Table 10**.

Case study: Argentina

The FMD campaign undertaken in South America during 1999-2004 has demonstrated the value of regional action when the control of TADs of major economic importance to the region is being sought. It also demonstrates the significance of maintaining the investment when pockets of resistance remain which risk to erupt to full blown outbreaks in countries of the region.

Some US$ 3.5 billion have been committed on the fight against FMD by South American countries during 1990-2004 (Figure 12), which is considered to have contributed to an effective control of the disease during this period (Figure 11).

Against this, in the space of only a year, the 2000/01 FMD outbreak in Argentina has resulted to losses in beef export revenue alone of US$ 439 million.

Preliminary results of on-going cost-benefit analysis of improvements in Argentina's and wider Latin American VS (OIE Regional Representation/CEMA) suggest that there are significant benefits in terms of both productivity gains and potential trade gains from investing in such improvements, and that the final outcome in terms of NPV and welfare gains justifies the investment.

For example, an increased expenditure of some US$ 18 million in Argentina's VS would result in productivity gains of US$ 20 million per year, and additional annual exports of 260.000 tonnes..

5.2. Vietnam (Asia)

5.2.1. Background

5.2.1.1. Importance of livestock sector to the economy

Vietnam's total poultry population is estimated at around 250 million birds, including 20-60 million ducks and geese. The livestock sector accounts for about 20% of the agricultural GDP or about 5% of the country's total GDP (A97). Poultry is the country's second most important meat category after pork, accounting for an estimated 13% of the total in 2004 (though it averaged about 16% prior to the onset of AI) (A9). Of this share, 70% is made up of chicken, and the remainder is mostly duck and geese. According to FAOSTA data, the sector has experienced strong growth during the 1990s and until the AI outbreaks (1990-2000: 5.8% average annual growth rate; 2000-03: 8.3%), but in 2004 the sector has dramatically recessed (-11.8%).

The bulk of the production is for domestic use: Vietnam is a net importer of livestock products, and their share of total agricultural trade value is very small.

Three basic systems of poultry production are identified in Vietnam: family, semi-commercial and commercial/industrial (A9, A16). An estimated 60-70% of poultry is raised in ‘backyard’ family farms (sectors 3 and 4) in close proximity to other birds. In fact, some 94% of the poultry keeping households are reported to fall in the category of a village and scavenging backyard system (A91). Few systems could be classified as being in sector 1 (industrial farms), and these account for 20-25% of the national production. The remainder 10-15% of poultry production is carried out by semi-industrial/commercial farms (sector 2). Poultry is generally sold live in local markets and slaughtered at home, while only a small number of birds are processed through slaughterhouses.

The relatively low costs of raising poultry relative to cattle or pigs make it the most popular livestock enterprise in Vietnamese rural households, constituting an important source of cash income – particularly for women – thus contributing significantly to poverty alleviation. It is estimated that some 70% of Vietnam’s 12 million rural households keep poultry. Poultry is the most important livestock-based income source for the poorest quintile, providing about 7% of cash income for these households, as well as being a relatively inexpensive protein source for their own consumption.

A classification of Vietnam’s socio-economic position in the world, as carried out for the purposes of this study, can be found in **Annex 3**.

5.2.1.2. Key AH problem areas

Vietnam was selected as a representative case study in Asia because of the HPAI relevance, both in terms of the significance of the outbreaks and in terms of the approach followed and the mobilisation of the international community.

The country suffers from a number of high risk factors with respect to AI. Apart from having a relatively high share of sector 3 and 4 poultry systems as discussed above, Vietnam is one of the most densely populated countries in the region and has one of the highest concentration ratios of poultry (501 chicken per sq. km, 716 domestic birds per sq. km) particularly in the areas affected by AI (A16). Further risks arise from farm management practices (close contact with animals and between domestic birds and wild birds) and along the value chain (particularly live bird markets) (A9). A final set of risks, particularly in the first wave of AI in early 2004, emerged from poor knowledge of the disease and how it spread (though this is less prevalent now), and from stakeholders’ efforts to circumvent the control measures imposed (this was not helped by the compensation policy that was first adopted, as will be discussed below) (A3, A9, A258).

Since the outbreak of the HPAI H5N1 strain in December 2003, in the three waves of the epidemic[106], Vietnam has accumulated by far the largest number of outbreaks in the world (2,368) or 52% of the total

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[106] According to WHO, the spread of HPAI can be categorised into three waves. The first wave of the disease lasted from December 2003 until March 2004, when disease spread to 57 of Vietnam’s 64 provinces resulting to 44 million birds dead/culled (including affected and non-affected birds) and the death of 16 people. The second wave, which was mainly confined to 17 provinces, began in April 2004 and lasted through November, resulting in the culling of 84,000 poultry (all of which were clinically affected), and claimed four people. A third wave of the disease began in December 2004, and until mid 2006 about 1.9 million birds had been slaughtered and twenty two people had died.

(followed by Thailand, which accounts for 24% of the total) (**Annex 2**). The response to the disease has included mass culling (with compensation) and an extensive national poultry vaccination program.

Despite improvements in the situation since late 2005, the disease is still uncomfortably present. Since December 2006 only, Vietnam has had 52 outbreaks of HPAI with 10,314 poultry deaths and 15,485 poultry destroyed[107]. This has led experts to conclude that HPAI has become endemic to Vietnam. WHO recently signalled that the outbreaks could take years to end definitely.

According to veterinary experts, including the OIE, the main challenges currently posed by the HPAI epidemic in the wider Asian region are set to continue for the foreseeable future (**Box 3**).

Box 3 Current challenges posed by the AI situation in Asia

1. Unprecedented cases and socio-economic impacts (increase of poverty, impediment to trade)
2. Repeated outbreaks since the end of 2003
3. Viruses holding a foothold and circulating
4. Threatening risks to human and animal health
5. No immediate eradication foreseen
6. Spread to new countries and re-emerging (including role of migratory birds)
7. Poor biosecurity – animal production systems
8. Gaps between legislation and its enforcement

Source: OIE Regional Representation for Asia and the Pacific, February 2006 (A100)

At the same time, Vietnam has reported the highest number of human HPAI infections in any country by a substantial margin. From December 2003, when the first human case was detected, to date there have been 93 confirmed cases (**Figure 9**). With 42 deaths, this gives a very high case fatality rate (45%) (**Figure 10**). Concern amongst experts, including the WHO, has arisen over the fact that the virus might mutate in a way that facilitates its transmission, both within and also between species, which would make it progressively more harmful.

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[107] Vietnam's latest report to the OIE on HPAI, 17 January 2007. A further 30 outbreaks are still recorded as unresolved.

5.2.1.3. AH services and institutional structures

Vietnam has committed significant national resources to the fight against avian influenza and for the prevention of a human pandemic. A National Steering Committee for the Prevention and Control of Avian Influenza (NSCAI) has been established in January 2004 as the national coordination mechanism for HPAI planning and supervision[108], while a National Steering Committee for H5N1 Avian Influenza among humans evolved from the National SARS Steering Committee (established in 2003) to deal with human health aspects. This is supplemented by Steering Committees at provincial and sometimes district level, established under the People's committees.

In September 2005 the NSCAI prepared a National Preparedness Plan in response to Avian Flu Epidemic H5N1 and Human influenza Pandemic (A326), which was approved by the Prime Minister in November 2005. This integrated plan designed responsive measures under WHO's pandemic phases and scenarios, and allocated responsibilities and actions for ministries, People's Committees at all levels and other organisations. In February 2006, the government established a National Task Force under the NSCAI, whose main task has been to develop the *Integrated Operational Program for Avian and Human Influenza* (OPI) covering the period 2006-10. These plans an their budgets are discussed in section 5.2.2).

Vietnam's animal health system as such is structured as follows. The Department of Animal Health (under the Ministry of Agriculture and Rural Development - MARD) co-ordinates national policy, while six Regional Veterinary Centres manage their particular territories. Each province has a sub-Department of Animal Health, which supervise more than 600 District Veterinary Services (A9).

Regarding the provision of animal health professionals, in 2004 a French mission to Vietnam[109] reports that, in contrast to many developing countries, geographical coverage in Vietnam is quite good. However, there is a lack of specialist knowledge, and their services are not used often, particularly for preventive care/vaccination. Back in 1998 IFPRI (1998) found that less than 1% of producers asked veterinary services for regular examination of their stock. Although the situation has improved since then, the proportion of birds per veterinarian, estimated at 145,200 birds, is considered to be rather low in comparison to the needs (A16). The public veterinary workers are supplemented by a network of private para-veterinary practitioners. Vétérinaires Sans Frontiers (VSF) in 2004[110] report that the cost of a visit of a para-veterinarian to treat a few birds is too high in relation to the value of the animals.

Moreover, according to the VSF, there is a lack of coordination between central and provincial levels resulting in difficulty applying national decrees, and a general lack of staff to keep up with inspection needs is also reported. AI outbreaks appear to have made all these problems more acute. Although extension services are prevalent throughout Vietnam, the VSF (2004) study reported no organisation in

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[108] The Committee which is composed of members of the various competent Ministries meets weekly to brief the government of the latest developments.

[109] D'Andlau, Georges et al (2004): "Avian Influenza Support Mission to Vietnam: Diagnosis and Short-term and Long-term Proposals". Paris: Agence Française de Développement.

[110] Delquigny, Thomas et al. (2004), Evolution and impact of avian influenza epidemic and description of the avian production in Vietnam, Final Report. Hanoi: Vétérinaires sans Frontières.

30% of districts and 70% of villages, suggesting a serious lack of capacity. State extension services have not traditionally focused on poultry production because for most producers, it is an activity involving little outlay of capital or time. Also, there is a major constraint in the transmission of information between the provinces and the central government, as the People's Committee has to endorse any outbreak and contribute to the compensation payment; consequently, poor province tend to under-report[111].

There is little evidence in the current literature on the evolution of Vietnam's animal health sector over time. The particular questions of interest would be: a) whether the resources committed to the animal health sector's restructuring since the AI outbreaks (as discussed in section 5.2.2) have paid off in improvements and b) whether the VS and the systems in place are currently prepared to prevent and/or control future outbreaks (not only of HPAI but also of other diseases).

Vietnam's VS were recently subject to an independent audit following the OIE PVS evaluation methodology. Although detailed results to date remain confidential, the general conclusion is that the country's VS can be considered to be in transition. This means that there has been a notable improvement in the last 3 years towards a generally good structure, particularly at national and regional levels, which would suggest that the effort undertaken so far is paying off. The structures that have now emerged can be used as a basis for further improvements. Some of the priority areas where further investment is needed include the establishment of strategic and operational plans for the VS (in particular to reinforce communication between regions and the centre, and restore the chain of command), building a national database for central data collection at national level (as part of the national animal health information system), maintenance and training of laboratory diagnostic capacity (including standard operating procedures for sampling and collection), improving quarantine and movement controls (equipment and training), reinforcing the food inspection system, and increasing/improving staff resources (inter alia through training and better pay)[112].

5.2.2. Cost of prevention and control systems

Vietnam's efforts to control HPAI were supported and co-ordinated from the outset by a platform of donor assistance which complemented multilateral assistance provided mainly by the World Bank and the EC, as well as direct bilateral financing and technical assistance. Up to December 2005, Vietnam had received some US$ 45.9 million in donor support to control HPAI (**Table 11**).

Table 11 Vietnam: donor support to HPAI control, 2003-05 (a)

	US$ million
Grants from country donors	17.8
Grants from international organisations	2.4

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[111] WB (2006): Vietnam Action Plan for Food Safety and Agricultural Health.

[112] The key priorities identified during the Vietnam PVS mission also reflect the concerns of the government. These priorities have been embedded in a road map which has just been approved by the Ministry of Agriculture and Rural development (MARD, April 2007): *Strengthening the national management framework in veterinary services, 2007 to 2010.*

	US$ million
- of which EC:	*1.9*
Grants supported through UNDP	7.7
WB AI Emergency Recovery Project, 2004 (A204)	5
WB National Health Support project	13
TOTAL	**45.9**

(a) does not include some support provided by NGOs and private companies

Source: Vietnam Ministry of Agriculture (MARD) and Ministry of Health (A271)

Due to these efforts, as discussed elsewhere in this Report, Vietnam's national integrated plan is one of the strongest not only in the region but also in the world (section 4.2.3). Indeed, the response and mobilisation of the international community and the cooperation of the national VS can be considered exemplary.

Currently, Vietnam's HPAI prevention and control operations are carried out in the framework of the Integrated National Strategy and Pandemic Response Plan (Red Book), and the Integrated Operational Plan (Green Book). The background to the development of these plans is discussed briefly below.

Following the National Preparedness Plan[113] of September 2005, specific action plans were approved for the human and animal health sectors: the National plan of Action on Human Influenza Pandemic Prevention and Control[114] (November 2005), and the Emergency Disease Contingency Plan for Control of HPAI (December 2005).

Built upon the National Preparedness Plan, the Integrated National Plan for Avian Influenza Control and Human Pandemic Influenza Prevention and Response 2006-2008 (A271), also known as **Red Book**, was completed in January 2006. The Red Book laid out the actions and the costs to undertake during 2006-2008 for the animal health and human health sectors. The plan supports the improvement of co-ordinated prevention and national preparedness, strengthening surveillance and early warning systems, strengthening HPAI control and outbreak containment and sets out the key areas to be addressed towards a medium term agenda. The estimated total budget required by the Red Book was US$266 million, of which US$ 137,5 million (52%) for the agricultural sector to control HPAI in domestic poultry and US$ 128,5 million (48%) for the health sector for preparedness and response to a human influenza pandemic[115].

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[113] The estimated required budget under this Plan was VND 8,877 billion, of which 45% for animal health, and 55% for human health. The budget for the human health was further sub-divided into: costs of treatment (accounting for 75% of the total); the costs of prevention; Tamiflu stocks; and other costs.

[114] The National plan of Action on Human Influenza Pandemic Prevention and Control estimated a cost of VND 17,000 billion for health activities in case of an outbreak of human influenza pandemic.

[115] A more detailed budget is provided in Table 1 of the Plan (A271)

Based on this Plan, a detailed Integrated National Operational Programme for Avian and Human Influenza 2006-2010 (OPI) (A270), also known as **Green Book**, was prepared by a Government Taskforce established by the Steering Committee with support from the UN Country Team, the World Bank and other donors participating in a Joint Assessment Mission from 18-28 April 2006 and finally endorsed by the international community. The plan is focused on the national preparedness, the improvement of the policy framework, public awareness and information activities as well as strengthening the disease control in the agricultural sector and the surveillance in both human and animal sectors. It constitutes the basis for the national VS to develop their own strategy to control HPAI. The total cost of the OPI was estimated at US$ 250 million, including US$31.2 million for the enhanced coordination activities (12% of the total), US$116.4 million for HPAI control and eradication activities in the agricultural sector (47%) and US$102.4 million for influenza prevention and pandemic preparedness in the human population (41%)[116].

The priorities proposed in the OPI have been discussed in a number of fora, while a number of international organisations (including the WB, the FAO, and the WHO) have been involved in a joint assessment mission during the plan's preparation, which assessed the country needs and financial requirements for the implementation of the Plan over the 2006-10 period.

In the animal health sector (HPAI Control and Eradication Strategy), the OPI's key components include the strengthening of VS, a control and eradication strategy, support to surveillance and epidemiological investigation, and support for poultry sector restructuring. The strategy foresees a stepwise approach in three phases:

(a) control phase (short term), in which the incidence of outbreaks is reduced by stamping out of outbreaks, mass vaccination and the start of improvements in bio-security (poultry production and changes to marketing practices). This phase is expected to continue in 2007, with some reduction of the national mass vaccination program occurring in 2006;

(b) consolidation phase (medium term), in which gains are maintained, further restructuring of the industry is undertaken, farms in the industrial sector demonstrate freedom from HPAI, and disease free compartments are expanded. This phase is to continue to the end of the OPI planning horizon, from 2008 to 2010; and

(c) eradication phase (long term) which will start in 2010 and will continue beyond the OPI period.

The bulk of the costs (**Table 12**) are foreseen for the control of the disease (65.9%) and, in accordance with the strategy, nearly half of the costs of this component are expected to be incurred in the short term (2006-07). The most significant expenditure of disease control is on targeted vaccination (US$ 25.6 million or 46.6%), followed by compensation to livestock owners and disease investigation (appr. US$ 12.5 million each or 22.6%). The strengthening of the VS comes second in the Plan (18.9%) and is expected to be undertaken in year 2 (2007); in addition, the bulk of the (epidemio) surveillance investment is envisaged for 2007. Most of the VS component is devoted to the development of laboratory capacity and equipment (US$ 12.2 or 92% of the total component).

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[116] All costs including contingencies. A more detailed budget is provided in Table 1, Annex 2 of the Plan (A109)

Table 12 Vietnam: HPAI Control & Eradication (AH component of Integrated Plan, 2006-10)

						US$ million (a)
	2006	**2007**	**2008**	**2009**	**2010**	**Total (a)**
A. Strengthening VS, of which	0.96	11.37	1.14	1.14	1.14	15.75
• *Laboratory development*	-	*7.35*	*0.85*	*0.85*	*0.85*	*9.90*
• *Additional equipment labs*	-	*2.30*	-	-	-	*2.30*
• *Training of laboratory staff and specialist*	*0.22*	*0.53*	*0.20*	*0.20*	*0.20*	*1.35*
B. HPAI Control, of which	13.89	13.18	9.69	9.19	9.21	55.17
• *Disease Investigation*	2.85	2.56	2.25	2.25	2.27	12.29
• ***Outbreak control (crisis)***	***3.12***	***3.12***	***2.62***	***2.62***	***2.62***	***14.00***
• *Vaccination*	*7.04*	*6.81*	*4.27*	*3.80*	*3.80*	*25.72*
• *Border controls*	*0.66*	*0.47*	*0.43*	*0.40*	*0.40*	*2.36*
• *Quarantine and movement control*	*0.22*	*0.22*	*0.12*	*0.12*	*0.12*	*0.80*
C. Epidemio-Surveillance, of which	0.52	2.08	1.21	0.42	0.22	4.45
• *Epidemiological research*	-	*1.65*	*0.99*	*0.20*	-	*2.84*
D. Poultry Sector Restructuring	0.26	2.64	2.58	2.38	0.51	8.37
TOTAL	**15.63**	**29.27**	**14.62**	**13.13**	**11.08**	**83.74**

(a) excludes contingencies – if contingencies are included total cost comes to US$ 91.9 million

Source: Vietnam OPI (A109)

Vaccination has been and continues to be a key component of Vietnam's control and eradication strategy. Since September 2005, three rounds of vaccination for smallholder and village poultry have been conducted and the number of outbreaks and culled poultry decreased significantly. Although the precise contribution of vaccination to the control of the disease can not be determined due to implementation of a number of measures simultaneously, this is considered to have reduced the size of the susceptible population (A7). Originally, some US$ 17.3 million were allocated to the vaccination program for the planned vaccination of 160 million poultry over a two-year period (MARD and FAO data), but the OPI envisages some US$25.6 million on targeted vaccination. By the end of January, 246 million doses had been administered, at an approximate cost of $10 million. This cost will reduce over time as the vaccination is targeted to high-risk production sectors and areas based on surveillance data and epidemiological studies. In addition to the costs for vaccines and the logistical costs of injecting into birds, a vaccination campaign for HPAI also includes costs for pre and post vaccination surveillance. The cost of this for the first two initial years of the campaign was estimated at US$ 1.13 million. The majority of this cost is spent on laboratory tests for active surveillance to detect circulating viruses.

Some examples of prevention and control costs, for the different components of a comprehensive surveillance system, vaccination and biosecurity, are provided in **Table 13** below.

Table 13 Vietnam: selected examples of prevention and control costs

Component	**Costs**
Comprehensive surveillance	Estimates of a 10 year strategy for Vietnam which includes heightened surveillance, improved biosecurity of markets, preventive vaccination and improved biosecurity on all types of farms (sectors 1 to 4) put the cost of the investment at between 4 and 6 times the benefit, depending on the assumptions made about the incidence of disease. (A76)
Early warning	Investment in early warning typically includes staff training, laboratory upgrades and information system upgrade from the field to the centre. For Vietnam the total cost would be approximately US$2.4 million, including setting up community animal health worker networks. In addition, there are recurrent costs, including field observation, sample taking and testing, reporting. In Vietnam, the cost would be around US$ 4.1 million a year, or US$ 41 million over ten years. (A76)
Laboratories	Upgrading of info systems: depending on the number of provinces and labs connected to the system this investment is estimated in Vietnam at some US$ 340,000 (if information systems for laboratories in two thirds of the provinces are upgraded and linked). (A7)
Vaccination	In Vietnam the budget allocation for the vaccination program was originally US$ 17.3 million for the planned vaccination of 160 million poultry over a 2 year period. By end of Jan 2006, 246 million doses had been administered at a cost of US$ 10 million. (A7) The estimated cost of mass vaccination – including pre- and post-vaccination serological surveillance (over a period of two years), followed by strategic serological surveillance (over five years) is US$ 39 million (operating costs), with an initial investment of US$ 2.7 million. A thorough post-vaccination surveillance (such as that performed in Europe or Hong Kong) in countries with dispersed poultry sectors (such as Vietnam) is estimated to be prohibitive. (A76).
Communication	A mass media campaign over a year to raise farmer awareness how to recognise AI and how to report it to the authorities costs US$1 million. The cost is relatively high due to the extensive production systems / backyard farming in the country. (A7)
Biosecurity (on-farm)	In Vietnam, due to the large number of smallholders, the costs of training for just 10% of the 7 million farms at a cost of US$50 per farm would amount to US$ 35 million. These costs would be faced by the government. In addition, there would be costs of investing in biosecurity (normally borne by farmers). Assuming a minimum investment of US$ 75-100 on average per farm (in fence areas for grazing and building a small shelter which are the minimum biosecurity measures), the cost is expected to be over US$500-700 million for investment costs alone and twice that for recurrent costs. This scale of investment is out of reach for most farmers (A7, A76). This raises questions on the usefulness of the Plan, if such a key component is in practice difficult to implement.
Biosecurity (in markets)	The total cost of upgrading markets in Vietnam to improve biosecurity would be between $5 and $10 million. (A76)

Source: compiled by Agra CEAS Consulting

5.2.3. Costs of outbreaks

Vietnam's losses from the AI epidemic have been extensively covered by literature, making this one of the best-documented countries on the subject. **Table 14** provides a picture of the direct and indirect impacts based on a selection from the available literature[117]. A more detailed calculation of the direct production costs and losses (including culling and control costs), based on the available literature and certain assumptions, is provided in **Table 15**.

A total 44 million birds were culled/died after the first HPAI outbreak in 2004. Although compensation was applied, this was judged to be at low level and reportedly acted as a disincentive for farmers to report the disease on time (A3, A258).

Table 14 Vietnam: selected direct and indirect impacts of AI outbreaks (a)

Direct costs and losses	
Production losses	In the first outbreak in 2004, 58 out of 64 Provinces were affected, and 17% of the total national poultry flock of 262 million birds (about 44 million) lost. The loss in terms of the value of birds was estimated at VND 800 billion (assuming an average farm gate price for chicken of VND 20,000 before AI) or US$ 53 million. According to other sources the value of the birds lost is even higher. In the second wave of outbreaks, the costs were smaller due to a less drastic approach to culling in which clinically infected birds only were slaughtered, and because the disease spread less. (A9, A16, A91, A204, A292)
Compensation	The central government budget allocated to AI compensation up to June 2005 amounted to VND 268 billion (US$ 17.2 million) (A3).
Culling & control costs	It was estimated to cost about US$ 0.25 per bird to cull and dispose approximately 200 chickens per farm (A7, A9, A91). Containing the first epidemic in 2004 is estimated to have costs the government about VND 400 billion (US$ 27 million) including the temporary labour for culling and disinfection, hiring of equipment etc. (A204)
Consequential on-farm losses	The loss of income, assuming poultry production fell to zero for a period of 3 months (during the moratorium on re-stocking), would amount to around VND 1.6 trillion (US$107 million), which is considered a realistic estimate of the actual losses caused by the 2004 crisis. (A204). The number of rural households directly involved in poultry production, predominantly carried out by women, is reported to have fallen by 50% (A40, A91).
Total direct impact	The WB has estimated the total direct impact in terms of the poultry sector's contribution to GDP (0.6% Vietnam before the HPAI epidemic). With poultry output down by around 15%, this part of economic loss is worth about 0.1% of GDP or about $45 million. On the other hand there have also been important substitution effects, especially towards production of pork. Combining these effects, the direct cost in Vietnam may be around 0.12% of GDP.

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[117] It is noted that the literature available on this subject in some cases may provide conflicting information due to the assumptions and base data used, e.g. on the bird value. The various results have therefore been calibrated and updated with latest evidence to provide a more accurate picture of the impact.

	(A140, A140a)
Indirect impact: ripple effects	
Prices of substitute products	A 2004 FAO survey found that in Vietnam, prices of non-poultry meats rose up to 30% when live-bird markets were disrupted by the AI outbreaks and remained high even after the poultry markets recovered, taking the purchase of meat out of reach for low income consumers. (A40)
Poultry prices and sales	At the lowest point of the HPAI crisis (Oct/Nov 2005), prices were 50-60% below normal, and the volume of poultry sales reported to have fallen by half, from about 40 million poultry per month to 20 million. When prices started recovering in December they were 30-60% lower than pre-outbreak levels, but supermarket prices were 25-35% higher (in fact these farmers and markets that sold certified products were able to capture higher prices). The volumes sold daily (poultry and eggs) were lower than pre-outbreak levels. (All unofficial data.) (A9)
Feed industry	The AI outbreaks have had a sharp effect on feed manufacturers, particularly those selling to semi-commercial producers. For instance, one major manufacturer reported a drop of 90% in feed production while another reported a drop of 60-70%. The cost of commercial feed accounts for up to 70% of the cost of raising industrial chicken, and Vietnam's poultry sector normally consumes an estimated 8-10 mt/year of complete feed, nearly all of which is directed toward semi-commercial and industrial farms. (A9)
Wholesale markets	The reorganisation of HCMC's chicken and egg production following the **HPAI** outbreaks (and the need to ensure product safety) led to a decline in the number of wholesale egg markets from 134 to 75, while the number of poultry markets fell from 1,550 to 7 (excluding supermarkets). (A9)

(a) The literature available on this subject may in some cases provide conflicting information due to the assumptions and base data used, e.g. on the bird value. The various results have therefore been calibrated and updated with latest evidence to provide a more accurate picture of the impact.

Source: compiled by Agra CEAS Consulting

Table 15 Vietnam: calculation of total direct costs of HPAI outbreaks (2004-05)

	VND	**USD (b)**
Total costs (2005) (a)	797,300,000,000	51,108,974
Total costs (2004-5) (a)	1,936,970,000,000	124,164,744
Total compensation provided (1)	267,991,000,000	17,178,910
Value of culled animals per head (2)	40,000	2.56
Compensation provided per head (3)	5,000	0.32
Restocking subsidy per head (4)	2,000	0.13
Culling and disposal costs per head (5)	3,900	0.25

	VND	USD (b)
Control costs per head (6)	3,000	0.19
Number of birds culled (2005)	*17,000,000*	
Total compensation (2005)	85,000,000,000	5,448,718
Total value of culled animals (2005)	680,000,000,000	43,589,744
Total restocking subsidy (2005)	34,000,000,000	2,179,487
Total culling and disposal costs (2005)	66,300,000,000	4,250,000
Total control costs (2005)	51,000,000,000	3,269,231
Number of birds culled (2004-5)	*41,300,000*	
Total compensation (2004-5)	206,500,000,000	13,237,179
Total value of culled animals (2004-5)	1,652,000,000,000	105,897,436
Total restocking subsidy (2004-5)	82,600,000,000	5,294,872
Total culling and disposal costs (2004-5)	161,070,000,000	10,325,000
Total control costs (2004-5)	123,900,000,000	7,942,308
Laying hen market value (7)	100,000	6.41
Poultry farming income (8)		
Normal' (pre-outbreak)	400,000,000,000	25,641,026
Crisis (average during crisis)	100,000,000,000	6,410,256
Total income loss during crisis	1,800,000,000,000	115,384,615

(a) includes culling (value of culled animals and culling/disposal) and control costs
(b) Exchange rate: 1USD = VND 15600
(1) To date central government funds allocated for AI amounts to VND 268 billion, from the budget of the National Prevention/Emergency Fund (around 15% of the budget) (source: A3)
(2) Assuming that the provided compensation from the Fund (at 5,000 VND per head) only represents 10-15% of the real market value. This is the real 'lost income per head' (source: A3)
(3) Compensation for culling only, at 5,000 VND per head
(4) On the basis of the provided compensation from the Fund for restocking (at 2,000 VND per head)
(5) Cost estimates per bird on the basis of destruction and disposal of 200 chickens per farm (source: A7)
(6) On the basis of the provided compensation from the Fund. Includes control costs during and after the outbreak (i.e. equipment, facilities, disinfectants, protective clothing, staff in quarantine stations etc.)
(7) The market value of a layer is considered to be 100,000 VND/head (source: A3)
(8) Monthly volume sales by price. Income during 'normal' and 'crisis' periods calculated as follows: At the lowest point of the crisis (Oct/Nov 2005), prices were 50 to 60% below normal, and volume of poultry sales had fallen from about 40 million poultry per month to 20 million (unofficial data, source: A9). Crisis period

assumed to be an average over 6 months (in the beginning crisis has a higher impact on sales/prices, with return to normal the impact progressively diminishes).

Source: Agra CEAS Consulting, based on data from literature (including A3, A7 and A9)

It is generally estimated that the economic impact of the AI epidemics has amounted to less than 1% of Vietnam's GDP. UN agencies have estimated that, in the first outbreak alone (when the impact has been more extensive) the total economic impact (including direct costs and losses and indirect impacts in upstream and downstream activities) have amounted to over US$ 200 million which was about 0.6% of the GDP that year (A204). Both the WB and the IMF have concluded that, in macroeconomic terms, the impact of avian flu on the country's economy has been very modest, and that despite the outbreaks the national GDP continued to post strong growth (rising by 8.4% in 2005) contributing the targets set within the Vietnam's poverty reduction strategy (A266, A266b).

The picture is, however, very different when the micro-economic impact of the disease is assessed. In Vietnam, relatively the largest losses were felt by small scale, often indebted, commercial chicken producers with limited numbers of other livestock[118] (A76). The social and economic costs were also particularly felt by Vietnam's millions of farm households with small numbers of poultry. Around 8 million of Vietnam's 12 million households were estimated to be engaged in poultry production prior to 2003, and this number is estimated to have fallen by 50% following the outbreak, suggesting a significant impact on the sector's restructuring (A9, A16)[119]. Moreover, the impacts are unevenly distributed, as income from poultry and eggs is relatively more significant for the poorest part of the population[120]. Simulation models (FAO PPLPI) show that a backyard poultry sales ban would result in up to 25% loss of income for the poorer households (losses could be reduced to 10% if there was some diversification towards alternative production); if households were also banned from raising poultry for their own consumption the loss could be double for the poorer households (A30).

If the outbreaks escalated into a human pandemic, this would have devastating economic and social consequences, including large-scale loss of livelihoods as well as lives. Vietnam, like other countries affected countries, confronts choices in balancing preparation versus action since both imply economic costs. At least three impacts should be considered under a human pandemic scenario: (a) effects of sickness and mortality on potential output; (b) private preventive responses to an epidemic; and (c) public sector responses.

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[118] Despite the fact that compensation was paid, this was at a lower rate than initially announced, was only paid to farmers that registered with the authorities, and there were delays.

[119] Although some of this restructuring was partly induced by government policies and not just the economic forces at play following the HPAI outbreaks.

[120] Vétérinaires Sans Frontières (VSF) in a case study of a village in the highlands of North Vietnam estimated that a smallholder lost US$ 69-108 from the **HPAI** outbreaks, including the value of lost birds and loss of an average 2.3 months with no activities (no income and consumption). In Vietnam about 18% of the households earn less than US$1 per capita a day and 64% of the households less than US$2. (A76)

5.2.4. Comparison of prevention versus outbreak costs

The animal health component of Vietnam's national Operational Programme for Avian Influenza and Human Influenza (OPI) for the 2006-2010 period comes to US$ 83.74 million. Of this total, the most significant amount (US$ 55.17 million) is earmarked for control activities (**Table 12**). Excluding the provision for control costs in the event of an outbreak (culling and compensation), total prevention and control activities as such (during 'normal times') come down to US$ 70.14 million. Other key components include the strengthening of VS as such, which accounts for US$ 15.8 million over the 5-year period, and vaccination (US$ 25.7 million). Estimates of the various components of surveillance, vaccination and biosecurity are also provided in some literature (**Table 13**).

Against these figures, the analysis of existing data suggests that direct costs of the 2004-05 HPAI outbreaks (including culling and control costs, excluding consequential on-farm losses) amounted to US$ 124.2 (**Table 15**). Our own estimates of a potential HPAI outbreak occurring in future suggest that, under the scenarios and assumptions presented in section 6, Vietnam could face total direct costs and losses (including consequential on-farm losses) of US$ 115.4 million a year.

These direct impacts are compounded by multiple indirect effects as described in **Table 14**. According to one source, the outbreak in 2004 is estimated to have resulted to total GDP losses in Vietnam of US$ 0.3 billion for that year alone (**Table 6**).

The comparison of the relative scale of the required investment for the next 5-10 years (as provided in the OPI budgets and estimates from literature) against the actual and potential outbreak costs involved is depicted in **Figure 13**. It is noted that the national OPI prevention and control figures are totals over a 5 year period, and the estimates of the various prevention and control components from the literature are totals over a 10 year period, while the outbreak costs are quoted as annual amounts. It is also noted that comparisons have been made only between the public investment components and the total costs. Components of an effective prevention and control system covered by the private sector, notably investment on biosecurity which is normally covered by farmers, have not been taken into consideration here. The scale of this investment (min US$500-700 in Vietnam) is considered prohibitive for the smallholder sector (**Table 13**).

The comparison clearly points to the fact that the potential benefits that can accrue from improving prevention and control are worth several times the investment. It is noted, however, that this relies on the assumption that a certain investment would result in gains in productivity and export earnings. The extent to which this will occur will depend on the effective design and implementation of the investment, to ensure the effective control of the disease. A risk factor will be the re-appearance of the disease, as is often the case in practice.

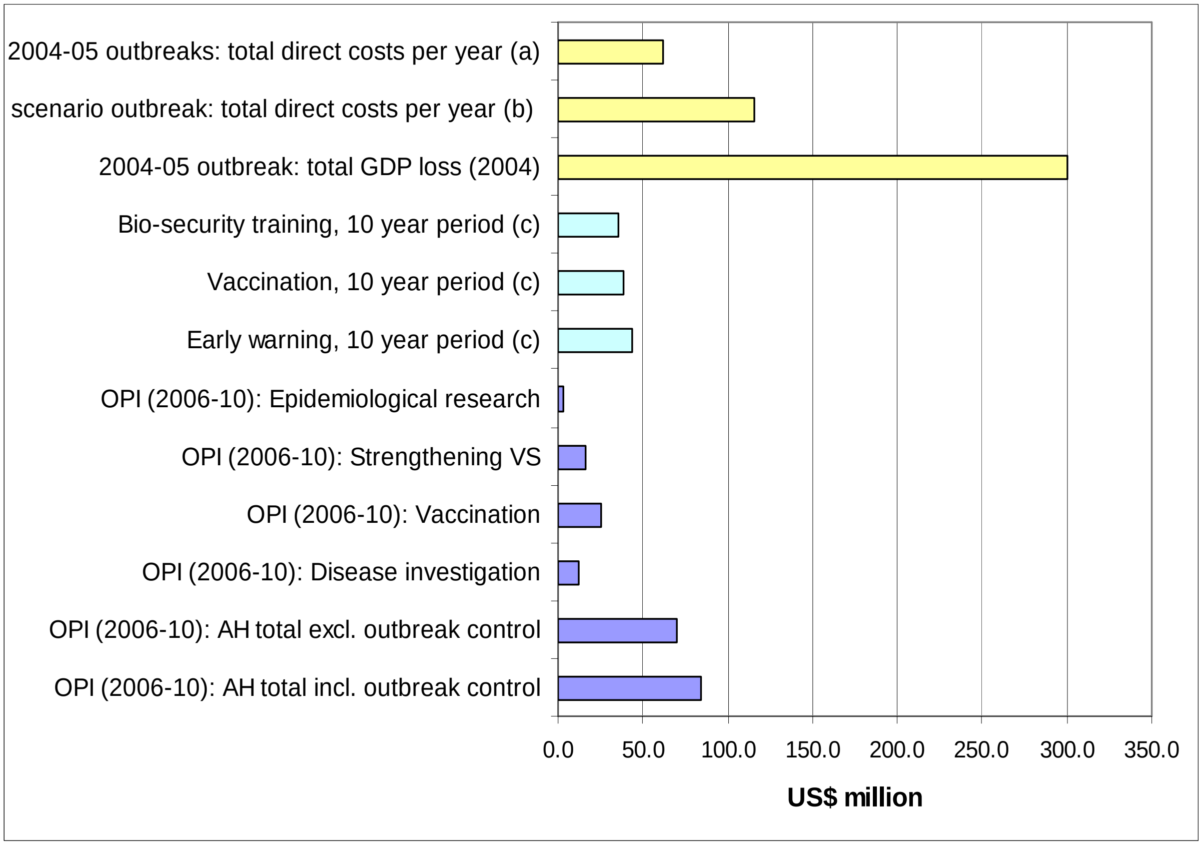
The above calculations do not take into account the incremental operational costs involved, which can be a significant part of the cost of strengthening VS.

On the other hand, the investment in strengthening the control of a particular disease, e.g. HPAI, can have important spill-over benefits on the entire VS.

Although these conclusions are made at macro-economic level, they have important implications at micro-level for individual farmers and other business relying on the poultry sector, particularly in the poorer rural parts of the Vietnamese population.

The OIE and the FAO estimate that between one third and one half of the population in the most affected areas of South East Asia earn at least part of their income from poultry farming. In Vietnam, 60% of the poorest section of the population, for whom poultry farming accounts for 6% to 7% of household incomes, is relatively more exposed to revenue losses caused by avian influenza. The number of rural households directly involved in poultry production, predominantly carried out by women, is reported to have fallen by 50% (**Table 14**). Although the smallest producers are the ones who have lost the least in absolute terms, in relative terms they have lost the most, with losses due to an outbreak costing several times their daily income (A292).

Figure 13 Vietnam: comparison of prevention versus outbreak costs



(a) annual; including consequential on-farm losses (source: Agra CEAS projection, **Annex 5**)
(b) annual average over 2004-05; excluding consequential on-farm losses (source: **Table 15**)
(c) estimates for a 10 year period (source: **Table 13**)

Notes:
OPI figures are totals over a 5 year period;
Bio-security training, vaccination and early warning estimates are totals over a 10 year period;
Outbreak costs are quoted as annual amounts;
Incremental operational costs (a significant part of the total costs of strengthening VS) are excluded from these calculations, due to lack of data.

Source: Agra CEAS Consulting, based on literature and own analysis

Our analysis in this section leads us to the following conclusions:

Case study: Vietnam

Vietnam suffers from a number of high risk factors with respect to HPAI. Consequently the government has committed significant national resources (including donor support) to the fight against avian influenza and for the prevention of a human pandemic. This has included extensive restructuring in the VS since the 2004-05 AI outbreaks, although there is little information to date on whether this has resulted in improvements that can effectively prevent/control future outbreaks (a recently concluded PVS evaluation is bound to shed more light on this).

Our analysis and comparisons of data on the committed national budgets for 2006-10 under the Operational Programme for avian influenza (animal health component) against real and projected costs of the outbreaks reveal the relative scale of the costs and benefits involved (see Notes*). These conclusions are supported by other work reviewed from available literature. For example:

- **The total commitment on animal health under the 2006-10 OPI (excluding control costs in the event of an outbreak) comes to some US$ 70 million for the 5 year period, while the total direct and indirect costs from the outbreak in 2004 alone is (conservatively) estimated at US$ 300 million (Figure 13).**
- **Investing in disease investigation and strengthening VS over the same period would cost public coffers a total US$ 30 million, compared to total direct production costs and losses during the 2004-05 outbreak of US$ 62 million a year and excluding consequential on-farm losses.**
- **Adding consequential losses, our projections of the total direct impact under the most likely scenario (which is milder than the 2004-05 epidemics) come to US$ 115 million a year.**

In a country where two thirds of the production is run by small holder systems and over two thirds of farms keep poultry, this analysis also demonstrates the potential benefits of improved prevention in terms of social equity and poverty alleviation (and even food security). Relatively the largest direct losses were felt by small scale, often indebted, commercial chicken producers, while Vietnam's millions of farm households with small numbers of poultry were also affected. Against this, investment in bio-security is estimated to require at least US$ 500 million for minimum improvements in the next 10 years, a cost prohibitive to small rural farmers.

* *Notes: These benefits assume that a certain investment will result in productivity gains and exports. The scale of the benefit is conditional on the effective design and implementation of the investment to be undertaken, leading to an effective control of the disease (eradication is questionable as there is a significant risk factor that the disease would re-appear, as has been the general experience. The above calculations do not take into account the*

incremental operational costs involved, which can be a significant part of the cost of strengthening VS. On the other hand, the investment in strengthening the control of a particular disease, e.g. HPAI, can have important spill-over benefits on the entire VS.

5.3. Nigeria (Africa)

5.3.1. Background

5.3.1.1. Importance of livestock sector to the economy

According to official figures[121], Nigeria has a total poultry population of 140 million, of which the sectoral distribution is 20% commercial integrated systems (sector 1 of the FAO classification), 10% semi-commercial (sector 2) and 70% backyard intensive and village farming (sectors 3 and 4) (A273, A293). Flock sizes vary from 5-49 birds in sector 4, up to a 1,000 birds in sector 3, 1,000-5,000 in sector 2 (mainly for egg production) and over 5,000 in sector 1. The types of domestic poultry found in Nigeria are chicken, pigeons, ducks, guinea fowls, and turkeys, but chicken are by far the most important species constituting over 90% of the total poultry stock.

The poultry sector is worth some US$230-250 million (about N30 billion) and contributes 9-10% to the country's agricultural GDP (which in its turn accounts for 35% of the national GDP). It also attracts a significant share of the investment on agriculture. Although Nigeria is a net importer both in terms of livestock products and poultry in particular, it is believed to have potential for export.

The sector's importance in socio-economic terms is crucial. Poverty alleviation is the central issue of the Nigerian economy, with about 60% of the population living below the poverty line[122]. The majority of the poor reside in rural areas and are engaged in some form of agricultural activity, including poultry. Apart from providing an important source of income, poultry is a major source of protein for the entire population (with protein intake still below the FAO recommended levels). Thus, a virulent disease outbreak such as the HPAI has major implications for both the income and food security of the country's rural and urban poor (A291).

A classification of Nigeria's socio-economic position in the world, as carried out for the purposes of this study, can be found in **Annex 3**.

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[121] These figures are reported to underestimate reality, due to the large numbers of unregistered poultry kept in poor rural and urban households.

[122] The Nigerian government is currently implementing a Poverty Reduction Strategy along World Bank and IMF recommendations (NEEDs: the 2004 National Economic Empowerment and Development Strategy), which focuses on Nigeria's commitment to rapid and sustainable growth and poverty reduction (A267). The strategy envisages an agricultural export target for 2007 of US$ 3 billion.

5.3.1.2. Key AH problem areas

Nigeria was selected as a representative case study in Africa because of the HPAI relevance. The country's HPAI problems are more recent, consequently an relatively limited number of outbreaks have been confirmed so far[123] (compared, for example, to Vietnam, **Annex 2**). However, the international community is concerned of the potential risks and ramifications of these outbreaks in the context of the extensive presence of rural/urban backyard farming, relatively weak biosecurity, and the socio-economic importance of the sector for the world's most poverty struck continent.

To date, the origins of the HPAI epizootic in Nigeria remain unknown, and neither introduction through poultry trade nor through migratory wild fowl can be ruled out (A169). A risk analysis previously undertaken in the context of Nigeria's HPAI Emergency Preparedness Plan (A286) identified three main risk factors: the high presence of wetlands (24 in total), 2 major migratory routes, and the relatively poor situation of the veterinary services.

Nigeria was the first country in West Africa to report HPAI amongst its poultry stock, as confirmed in February 2006[124]. Despite control measures having been taken, including culling and quarantine, the spread of the disease has been rather quick. Starting from three states in January 2006, it spread to 11 states in March 2006, to 13 states and the Federal Capital Territory as at May 2006, and to a total 36 states by the end of the year[123]. HPAI continues to be present with more suspected cases and culling activity announced in January this year (EMPRES-ECTAD, 24 January 2007).

5.3.1.3. AH services and institutional structures

The Nigerian Veterinary Services are headed at the federal level by the Director of the Federal Department of Livestock and Pest Control Services (FDL&PCS), which operates under the Ministry of Agriculture and Natural Resources, and at state level by the Director of State Veterinary Services. The FDL&PCS is divided into eight Divisions, namely: the Animal Health, Quarantine Services, the Veterinary Public Health, Livestock Development, the Planning and Research, Pastoral resources, NLPD as well as the Pest Control Division. The FDL&PCS has field offices at the various state capitals while each state veterinary service has area offices at the local government headquarters. According to the Nigerian VS, this setup is designed to enable efficient and early collection of information on TADs including HPAI. Although by law the state Directors of Veterinary Services are in-charge of animal disease control, emergencies arising from major transboundary animal diseases such as HPAI should be under the overall command of the DFDL&PCS.

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[123] An Inter-Agency (FAO/OIE/AU-IBAR) mission to Nigeria reported that as at mid October 2006, 43 Local Government Areas in 15 states (including the Federal Capital Territory) had been recorded as suffering outbreaks at some point. In total, some 500 outbreaks had been reported, of which approximately one quarter had been confirmed as caused by H5N1 HPAI.

[124] Case first suspected on 16 January (Sambawa Farm), sample sent for testing to Padova, Italy on 3 February, confirmation (H5N1) received on 7 February, announcement made public 8 February.

The FDL&PCS had begun to work on a response to the global threat of HPAI already in 2003. In anticipation of an eventual HPAI outbreak, in December 2005 a Technical Committee of Experts for the prevention and control of HPAI was set up. This was actively involved in the development of an HPAI emergency preparedness plan (for animal health), which was circulated in January 2006 and reviewed/extended in February 2006[125] (A286). The Plan was drawn following FAO recommendations for preparing National Animal Disease Emergency Preparedness and Contingency Plans for major TADs and the Australian Veterinary plan (AUSVETPLAN). It was later to be fine-tuned with Annexes containing the resource plans, both material and human, as well as Standard Operating Procedures (SOPs). The Plan was supplemented by an action plan for communication and public awareness (social mobilisation). All these plans were later integrated into a national strategy document. The national policy envisaged control by stamping-out of infected farms with payment of compensation for birds culled, but excluded vaccination. Following the February 2006 confirmed outbreaks, an i*nter-ministerial* Steering Committee of Experts on avian influenza[126] was also set up, and a National Technical Committee on Avian Influenza for the coordination and implementation of the plan.

Several experts have pointed to the inadequacy of current VS structures (A169, A203, A293, A291). The available literature and information from sources contacted in Nigeria point to certain deficiencies that may have aggravated the initial impact of the disease. A major impediment in the early days that the disease was suspected in Nigeria was considered to be the lack of local/regional testing capability to test for the disease. This was seen as adding to the delays in confirming and reporting the disease which may have contributed to the escalation of the spread (A293). Furthermore, although a preparedness plan was in place this was not considered to be adequate (*inter alia* due to lack of funding) when the emergency arose (A169).

International agencies and organisations (including the FAO, OIE, AU-IBAR and the WB) have in various instances indicated that the overall capacity of the federal as well as of the state VS in handling disease emergencies to be relatively weak (e.g. A203, A169). Years of under-funding were considered to have led to a weakening of the system, and a generally dysfunctional chain of command between the central VS and the field services. An exception appears to be the National Animal Disease Surveillance System (NADIS), which by adopting a supra-state zonal approach had established good working relationships with the state veterinary services. For example, the system had been re-oriented to increase surveillance of suspect mortalities in both domestic and wild fowl.

The country's capacity in veterinary human resources is considered by the national authorities to be adequate to detect and control most TADs[127]; however it is acknowledged that most of the veterinarians do not have first hand experience with AI this being an emerging disease and that therefore specialised training to the detection, diagnosis and control of the disease would be required (A286). More than 600 Nigerian animal health officials have been trained under a scheme funded by the European Union and the FAO to undertake a nationwide surveillance to track bird flu. These experts would be deployed in January 2007 across the country, to provide the much needed local resource for testing any suspected cases[128].

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[125] "*Strategies for prevention of introduction, disease surveillance networking and the contingency plan for prevention and control of the HPAI in Nigeria*" (A286)

[126] The Committee united amongst others, the Federal Ministers of Agriculture and Rural Development (MARD), Health, Information and National Orientation, several State Commissioners for agriculture and health and stakeholders within the international community (including the WB and WHO).

[127] Nigeria has five University veterinary faculties that produce graduate veterinarians; at the time of the HPAI first outbreaks there were about 4,586 registered veterinarians in addition to 7,810 livestock scientists, laboratory technologists and animal health auxiliaries in the country.

Despite these shortcomings, an inter-Agency mission (FAO/OIE/AU-IBAR) conducted in October 2006 concluded that the first phase of HPAI control in Nigeria has been reasonably successful and that the elimination of the infection could possibly be contemplated within the short to medium term depending on the control measures to be taken (A169). Recommendations for further action include: a) enhancing surveillance (*inter alia* through: support to the National Veterinary Research Institute – NVRI; enhancing active surveillance in smallholder village poultry, and the active engagement of private veterinarians); and b) enhancing control measures (*inter alia* through improved conditions for timely and adequate compensation; reviewing vaccination policy, particularly on targeted and/or ring vaccination; improving and consolidating the national emergency preparedness plan; and developing a clearly defined national strategic plan for the progressive control and elimination of HPAI).

In March 2006, the Federal government of Nigeria and the World Bank signed a US$ 50,000,000 special credit agreement, in the context of the GPAI/APL programme, for a project targeting both AI control and human pandemic preparedness (A203). The animal health component of this plan was based on a review of the key institutions and their readiness to perform the required/intended tasks. It deals with four main themes, namely surveillance, early detection and rapid containment, control at source in birds, and risk communication. As such, the project deals with many of the above issues and recommendations identified by the inter-Agency mission and the Nigerian authorities. Further budgetary details of this project are given in **Table 17**.

An independent OIE mission to assess the state of Nigeria's VS on the basis of the PVS tool has just taken place[129].

5.3.2. Cost of prevention and control systems

The total estimated budget under the Nigerian preparedness plan (A286) was N (Nigerian Naria) 880 million (or US$ 6.9 million). Of this, N 400 million (44%) was envisaged for strengthening diagnostic laboratories, N 200 million (22%) for stamping out including compensation, N 100 million (11%) for strengthening the veterinary quarantine infrastructure, N 100 million (11%) for research (including on vaccine development), and N 80 million (9%) for targeting the disease and sero-surveillance (**Table 16**). An additional US$400,000 was foreseen for vaccine procurement (for 20,000 doses/annum). Despite the detailed technical components of this plan it is understood that, at the time of the February 2006 outbreak, funding had not yet been mobilised for the plan's prompt execution.

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[128] More information on this service can be found at the OIE database.

[129] 20 August to 5 September 2007

Table 16 Nigeria: Budget for HPAI emergency preparedness and response (2006-07)

Activity	**N million**	**US$ million, (a)**
Strengthening the diagnostic laboratory	400	3.12
Stamping out and compensation	200	1.56
Strengthening the veterinary quarantine infrastructure	100	0.78
Research	100	0.78
Targeting the disease and sero-surveillance	80	0.62
TOTAL	**880**	**6.87**

(a) 1 Nigerian Naira = US$0.0078 (current exchange rate)

Source: National strategies for prevention of introduction, disease surveillance networking and contingency plan for a disease emergency (A 286)

The largest component of this plan was the strengthening of laboratory diagnostic capabilities. This envisaged upgrading the diagnostic capacity of the six designated laboratories for carrying out HPAI diagnosis in Nigeria (NVRI, VTHs at Zaria, Ibadan, Maiduguri, Nsukka and Sokoto. Each of these laboratories was expected to have the capacity to carry out screening direct antigen detection tests, immunoflourescence test and serological tests for antibody detection, while the NVRI would carry out virus isolation and identification. Regional laboratory networking was also foreseen. The plan also envisaged exploring (with the FAO, WHO, IAEA and OIE) the prospects for a Technical Cooperation Project (TCP) to enhance Nigeria's HPAI diagnostic capacity[130].

The importance of focussing the effort on the NVRI services so as to enable it to provide the full range of diagnostic services was also confirmed by the interagency mission of October 2006 (A169). It should be noted that, to improve diagnostic capacity for the Africa region as a whole, the possibility of establishing a regional AI reference laboratory within one of the West African countries has been suggested by stakeholders as one option to explore[131] (A293).

The WB APL credit facility of March 2006 (A203) has a total budget of US$ 58.4 million (excluding contingencies), of which US$ 29.2 million for animal health, US$ 18.3 million for human health, US$ 4.1

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[130] A TCP project for an Active Avian Influenza Surveillance study in Nigeria is currently under way (2006/07) with a total budget of US$653,000. Nigeria also benefits from other regional/global TCP projects including the emergency assistance for the control and prevention of avian influenza in sub-Saharan Africa 2006/07 (global budget: US$3.4 million), and the global emergency assistance for the control and prevention of avian influenza (US$ 3.5 plus US$ 5.9 million for 2005-07).

[131] Workshop on AI organised by WANSCA, Ghana, September 2006 (A291). WANSCA: West African Network for the promotion of Short Cycle Animals in rural areas.

million for Social Mobilisation and Strategic Communication and US$ 6.9 million Implementation Support and Monitoring & Evaluation. The animal health component covers 6 areas and a detailed budget breakdown is presented in **Table 17**.

Table 17 Nigeria: HPAI Control & Eradication (AH component of Integrated Plan, 2006-10)

	US$ million (a)			
	2006	**2007**	**2008**	**Total**
A. Strengthening HPAI control programmes	2.69	2.89	1.01	6.59
B. Strengthening disease surveillance, diagnostic capacity and applied research	2.84	1.59	0.52	4.95
C. Strengthening veterinary quarantine services	1.78	2.33	1.03	5.14
D. Enhancing HPAI prevention and preparedness	0.77	0.86	0.08	1.72
E. Improving bio-security in poultry production	0.49	0.29	0.20	0.98
F. Compensation & economic recovery	6.67	2.06	1.08	9.82
TOTAL	**15.25**	**10.03**	**3.92**	**29.20**

(a) excludes contingencies

Source: Nigeria WB GPAI/APL (A203)

The 2006 ALIVE Africa needs assessment presented in Bamako in December (A258) provides estimates of the total animal health component for fighting AI in Nigeria at US$ 40 million over a 10 year period (global budget for Nigeria including all other components of AI prevention and control is US$ 84.3 over the same period). These estimates are largely in line with the current Nigerian WB APL project. Nigeria needs are some of the highest identified by the ALIVE assessment (**Figure 5**).

5.3.3. Costs of outbreaks

According to data from the FDLPCS, as at mid October 2006, some 400,000 poultry died and 900,000 were culled (A169). Culling continues this year, with already some 20,000 poultry culled in week 3 in the NW of the country where fresh cases were detected in January EMPRES-ECTAD.

The main control measures used were stamping out with compensation (vaccination was excluded). A government-funded (US$ 847,558 since 2003) compensation scheme was put in place in March 2006 compensating farmers at 30-50% of the market value (A236b) (further details on this scheme can be found in Deliverable 2).

Some of the costs resulting from the AI outbreaks in Nigeria is provided in **Table 18**. On the whole, the total economic impact for Nigeria from the HPAI crisis, including direct and indirect losses, is estimated by the UNDP Nigeria to have been at least N1 billion (US$7.9 million) (A293). Although a significant figure as such, this corresponds to 0.01% of the latest GDP estimates for 2006 ($115.6 billion[132]).

A recent IFPRI study uses a spatial equilibrium model that makes use of the latest spatial distribution data sets for poultry and human populations to analyse the potential impact of AI in West Africa, using Nigeria as an example. The study finds that, depending on the size of the affected areas, the direct impact of the spread of AI along the two major migratory bird flyways would be the loss of about 4% of national chicken production. The indirect (ripple) effects of consumers' reluctance to consume poultry if AI is detected, causing a decline in chicken prices, are generally found to be larger than the direct effect. It is estimated that, if the worst-case scenario occurred (AI spreads >20km along the two major flyways), Nigerian chicken production would fall by 21%, prices by 12% and the combined result could mean that poultry farmers would lose up to US$250 million of revenue (A98). In the best case scenario (AI confined in a narrow zone within the flyway), the total loss to farmers would be US$ 48-52 million.

Table 18 Nigeria: selected direct and indirect impacts of AI outbreaks (a)

Direct costs and losses	
Production losses	As at mid-June 2006, the HPAI outbreak caused a loss of approximately 890,000 birds through deaths and stamping out. At an average farm gate price of about N700 per bird, the farm gate value of the birds lost was about N 617 million (or US$ 4.8 million). These figures are based on official estimates, and are believed to under-estimate reality, because the actual poultry population wiped out in rural areas remains unknown (A293).
Culling costs	Culling teams were organised on an ad hoc basis and the costs were estimated to reach about US$ 1.00 per bird, if the team culled 1,000 birds within a day (culling and disposal costs). (A7, A258).
Re-stocking costs	The cost of restoring the affected poultry units back to pre-outbreak levels is estimated at about N889 million (or $6.95 million). In addition, there was a 45% drop in the flock size of the non-affected farms, mainly because of lack of funds to feed the birds which forced many farmers to reduce flocks, and it is unclear whether these farms will recover. (A293)
Consequential on-farm losses	The UNDP rapid assessment survey revealed that 80% of workers in the affected farms and 45% of those working in non-affected farms have lost their jobs as a result of the HPAI outbreak. (A293)
Indirect impact: ripple effects	
Poultry sales	Egg and chicken sales declined by 80% within 2 weeks following the announcement of HPAI outbreaks in Nigeria in February 2006 (UNDP data and Nigerian Poultry Association – PAN). Up to 4 months after, the recovery rate was still below 50%. (A293)
Feed industry	Following the HPAI outbreaks in Nigeria in early 2006, poultry feed sales dropped by 82%, and only 43% recovery (to pre-outbreak levels) had been attained by May 2006. Even in non-

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[132] Source: Economist Intelligence Unit (EIU) estimate for 2006 at market exchange rate. Exchange rate (av) N:US$: 127.4

	affected farms, following a 45% drop in the flock size (as farmers were cutting down flocks due to lack if funds to feed the birds), the level of feed usage declined by 55%. The loss to feed mills is estimated at about N 60.5 million ($0.5 million), on the basis of average feed consumption per bird (0.135 kg per day) and assuming it takes about seven months for the feed mills to fully recover from the shock at a constant rate; this translates to a 3.5 month volume of feeds (the average price per ton of feed is about N 48,000). (A293)
Traders/ markets	Associated businesses such as those trading in poultry products are estimated to have lost close to N 61.7 million ($0.5 million): this is estimated as the 10% of the farm gate price of the number of birds that were either culled or dead as a result of the HPAI. One live chicken sellers' association (Abubakar Rimi Market in Kano, reputed to be the largest local chicken market in Nigeria), claimed that their sales dropped from 10,000 birds to only 1,000 birds per day in February/March 2006. The price per bird also crashed during the crisis. Similar experiences were reported in other markets. (A293)
Catering industry	A sharp drop by 81% was reported in sales in restaurants, fast food business outlets, roadside roasted chicken sellers and egg sellers within 2 weeks following the announcement of HPAI outbreaks (February 2006), which by May 2006 had only recovered to 67.7% of the pre-outbreak sales. (A293)

Source: compiled by Agra CEAS Consulting

A more detailed calculation of the direct production costs and losses based on the available literature and certain assumptions is provided in **Table 15**.

Table 19 Nigeria: calculation of total direct costs of HPAI outbreaks (2006)

	Nigerian Naria (N)	**USD**
Total costs (Oct. 2006) (a)	1,068,760,000	8,389,011
Total costs (est.) (a) (c)	2,313,696,000	18,160,879
Total compensation (2006 est.) (c)(d)	655,855,200	5,148,000
Value of culled animals per head	700	5.49
Compensation rate per head (d)	248	1.95
Culling and disposal costs per head (e)	127	1.00
Control costs per head (f)	49	0.38
Number of birds culled (Oct. 2006) (b)	*900,000*	*900,000*
Number of birds died (Oct. 2006) (b)	*400,000*	*400,000*
Number of birds culled (est) (c)	*2,640,000*	*2,640,000*
Total value of culled/dead animals (Oct. 2006)	910,000,000	7,142,857
Total culling and disposal costs (Oct. 2006)	114,660,000	900,000
Total control costs (Oct. 2006)	44,100,000	346,154
Total value of culled/dead animals (est.) (c)	1,848,000,000	14,505,495
Total culling and disposal costs (est.) (c)	336,336,000	2,640,000
Total control costs (est.) (c)	129,360,000	1,015,385

	Nigerian Naria (N)	USD
Market price (layer) (g)	700	5.49
Market price (broiler) (g)	1,000	7.85

(a) includes culling (value of culled animals and culling/disposal) and control costs
(b) FDLPCS official data (A169)
(c) assuming disease continues on same course (as in the first 2 months) - the total number of poultry losses in the first 2 months after outbreak first occurred (Feb 2006) was 440,000 (A258)
(d) on the basis of government announcement, compensation for culling only
(e) cost estimates per bird on the basis of destroying and disposing of 1000 birds per day by ad hoc organised teams (A7)
(f) assumed to the double that of Vietnam as more costly to organise (for culling/disposal costs per bird ratio of Vietnam to Nigeria was 4:1)
(g) range of current chicken market price (source: UNDP Nigeria, A293)
Exchange rate: 1USD = 127.4 Nigerian Naria (source: EIU)

Source: Agra CEAS Consulting, based on data from literature (including A7, A169, A258 and A293)

5.3.4. Comparison of prevention versus outbreak costs

Although no cost-benefit analysis as such of Nigeria's prevention and control strategies currently exists in the reviewed literature, from a comparison of prevention to outbreaks costs significant conclusions can be drawn.

The total budget of Nigeria's national preparedness plan came to a total US$ 5.31 million excluding stamping our and compensation in the event of an outbreak (**Table 16**). The animal health component of the WB Integrated plan for HPAI control and eradication for 2006-10 comes to a total US$ 29.2 million over the 5 year period (**Table 17**). Of this total, some US$ 6.59 million is earmarked for control (culling and compensation activities) in the event of an outbreak. Excluding this provision, total prevention and control activities as such (during 'normal times') come down to US$ 22.6 million. Other key components include the strengthening of veterinary quarantine, which accounts for US$ 5.1 million over the 5 year period, strengthening disease surveillance (US$ 4.95 million), and the establishment of a compensation fund and economic recovery schemes for vulnerable farmers (US$ 9.8 million). Finally, the ALIVE assessment (A258) gave estimates of the total animal health component for fighting AI in Nigeria at US$ 40 million over a 10 year period.

Against these figures, the analysis of existing data suggests that direct costs of the 2004-05 HPAI outbreaks (including culling and control costs, excluding consequential on-farm losses) amounted to US$ 8.4 as at October 2006 (**Table 19**). It is noted that, unlike in the case of Vietnam, in Nigeria the economic impact was not as high due to the relatively short timeline of these calculations. However, if projected on a yearly basis, assuming the disease continued on the same course as in the first 2 months, then direct costs could reach US$ 18.2 million. Our own estimates of a potential HPAI outbreak occurring in future suggest that, under the scenarios and assumptions presented in section 6, Nigeria could face total direct costs and losses (including consequential on-farm losses) of US$ 113 million a year (i.e. of a scale similar to Vietnam). To these direct impacts are added the various indirect effects described in **Table 18**.

The comparison of the relative scale of the various prevention plans and needs assessments against the actual and potential outbreak costs involved is depicted in **Figure 14**. It is noted that the WB control and eradication plan's figures are totals over a 5 year period, and the ALIVE estimates are totals over a 10 year period, while the outbreak costs are quoted as annual amounts. It is also noted that comparisons have been made only between the public investment components and the total costs. Components of an effective prevention and control system covered by the private sector, notably investment on biosecurity which is normally covered by farmers, have not been taken into consideration here. The scale of this investment is considered to be similar to other smallholder countries with similar poultry farming and developing country features such as Vietnam, where these were estimated at min US$500-700. This type of investment is considered prohibitive for the smallholder sector.

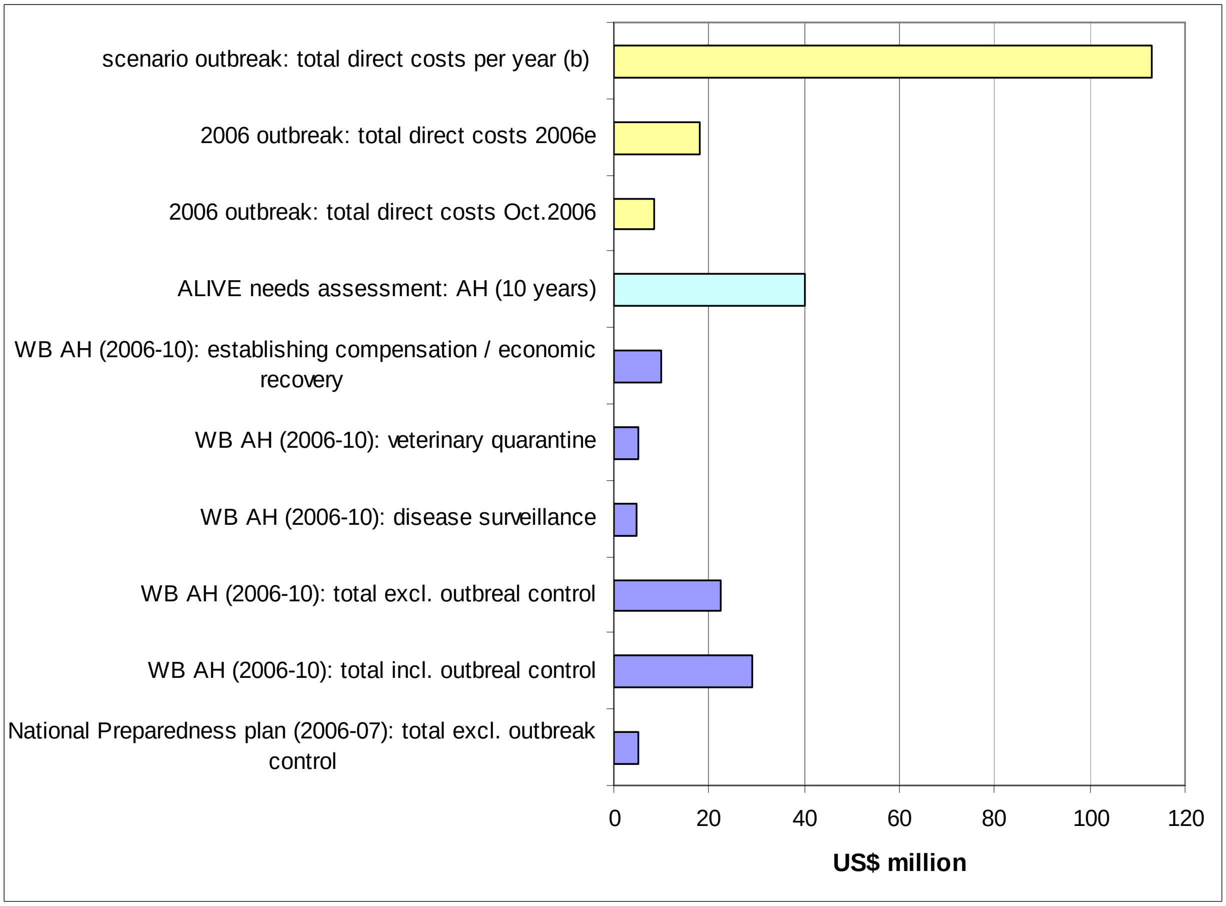
The comparison clearly points to the fact that the potential benefits that can accrue from improving prevention and control are worth several times the investment. It is noted, however, that this relies on the assumption that a certain investment would result in gains in productivity and export earnings. The extent to which this will occur will depend on the effective design and implementation of the investment, to ensure the effective control of the disease. A risk factor will be the re-appearance of the disease, as is often the case in practice.

The above calculations do not take into account the incremental operational costs involved, which can be a significant part of the cost of strengthening VS.

On the other hand, the investment in strengthening the control of a particular disease, e.g. HPAI, can have important spill-over benefits on the entire VS.

As in the case of Vietnam, the conclusions drawn at macro-economic level have important implications at micro-level, for individual farmers and other business relying on the poultry sector, particularly in the poorer urban and rural parts of Nigeria. It is estimates that some 70% of poultry is kept in backyard and village farming.

Figure 14 Nigeria: comparison of prevention versus outbreak costs



Notes:
WB control and eradication plan's figures are totals over a 5 year period;
ALIVE estimates are totals over a 10 year period;
Outbreak costs are quoted as annual amounts;
Incremental operational costs (a significant part of the total costs of strengthening VS) are excluded from these calculations, due to lack of data.

Source: Agra CEAS Consulting, based on literature and own analysis

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Our analysis in this section leads us to the following conclusions:

Case study: Nigeria

Nigeria's experience in this area is relatively more recent and more limited compared to Vietnam. However, both the government and international community are concerned of the potential risks and ramifications of these outbreaks in the context of the extensive presence of rural/urban backyard farming, relatively weak biosecurity, and the socio-economic importance of the sector.

Our analysis and comparisons of data on the planned commitments for 2006-10 under the WB integrated plan for the control and eradication of avian influenza as well as under the ALIVE needs assessment for Nigeria, against real and projected costs of the outbreaks, reveal the relative scale of the costs and benefits involved (see Notes). For example:

- **The total commitment on animal health under the 2006-10 WB plan (excluding control costs in the event of an outbreak) comes to some US$ 22.6 million for the 5 year period (or an average US$ 4.5 million per year), while the direct costs from the outbreak in part of last year alone is (conservatively) estimated at US$ 8.4 million and excluding consequential on-farm losses (Figure 14).**
- **Investing in strengthening disease surveillance and veterinary quarantine would cost a total US$ 10 million over the same period, or US$ 2 million a year which is less than 25% of the above conservative estimate.**
- **The relative scale of this investment is even more evident when adding consequential losses, with our projections of the total direct impact under the most likely scenario (which is milder than the 2006 epidemic) reaching US$ 113 million a year.**

In a country where two thirds of the official (registered) production is run by small holder systems and poultry rearing is central to the survival of poor rural and urban communities, this analysis also demonstrates the potential benefits of improved prevention in terms of poverty alleviation and food security.

Notes: These benefits assume that a certain investment will result in productivity gains and exports. The scale of the benefit is conditional on the effective design and implementation of the investment to be undertaken, leading to an effective control of the disease (eradication is questionable as there is a significant risk factor that the disease would re-appear, as has been the general experience. The above calculations do not take into account the incremental operational costs involved, which can be a significant part of the cost of strengthening VS. On the other hand, the investment in strengthening the control of a particular disease, e.g. HPAI, can have important spill-over benefits on the entire VS.

5.4. Romania (East Europe)

5.4.1. Background

5.4.1.1. Importance of livestock sector to the economy

Despite the ongoing economic reform process which have affected the size of the Romanian agricultural sector, this still plays a critical role in the national economy, contributing 11.9% to GDP and occupying 35% o f the total labour force in 2003.

Within this context, the size of the Romanian poultry sector has nearly doubled (in terms of production volumes) since 2000. In 2005, domestic consumption of poultry meat increased by 19% compared to the previous year to a total o f around 375,000 tons, o f which 59% or 220,000 tons were produced domestically. This excludes subsistence farming which is very prevalent in the country. Including production for own consumption, Romania's total annual domestic output of poultry is estimated at around 360,000 tons.

It is estimated that nearly 70% o f the country's poultry population (of 70 million birds) is kept in small-holder ("backyard") systems. A typical small-holder farm in Romania keeps 20 chickens, 10 ducks, 5 turkeys, 3 geese, 3 swine, 10 sheep and goats, a cow and a horse living in immediate proximity. Most of the backyard poultry is produced for own consumption or for sale at local (live bird) markets. This sector if generally characterised by low bio-security.

On the other hand, Romania's commercial poultry production is highly concentrated, with 15 large scale producers holding about 60% of the total commercial production. In this sector too, bio-security concerns have been raised, particularly from the more recent AI outbreaks (A93a).

A classification of Romania’s socio-economic position in the world, as carried out for the purposes of this study, can be found in **Annex 3**.

5.4.1.2. Key AH problem areas

Romania was selected as a representative case study in Europe because of the HPAI relevance, but also the fact that the country’s VS have undergone significant restructuring and upgrading in the run up to EU accession (Romania became an EU member on 1 January 2007). The country has had 168 outbreaks since 2004 (**Annex 2**), and only recently was declared HPAI-free (1 October 2006)[133].

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[133] According to Article 2.7.12.4. of the OIE *Terrestrial Animal Health Code* states a country may regain its status as avian influenza-free 90 days after *“a stamping-out policy (including disinfection of all affected establishments) is applied, providing that surveillance in accordance with Appendix 3.8.9. has been carried out during that three-month period”*. The last culling and disinfection were completed on 1 July 2006. Since then, clinical and virological surveillance nation-wide have found no positive cases of HPAI. The event is therefore considered resolved. Romania therefore declares having regained its status as a highly pathogenic avian influenza-free country on 1 October 2006. (OIE Final Report No 4, 21 December 2006).

5.4.1.3. AH services and institutional structures

The Central Competent Authority for veterinary services in Romania is the National Sanitary Veterinary and Food Safety Authority (ANSVA). The ANSVA is organised in four directorates: 1- Veterinary, 2- General Food Safety, 3- Inspection, Control, BIPs and Co-ordination of Veterinary Institutes and 4- Economical-administrative, Juridical and International Relations, ANSVA is responsible for supervision, prevention, risk analysis, control, inspection and authorisation in the fields of animal health and welfare, food safety and border inspection posts (BIPs). The Authority is an independent body with its own budget and it is managed by a President (ranked as State Secretary) reporting directly to the Prime Minister (EC DG SANCO/FVO mission reports).

ANSVSA employs about 3000 regular staff and some 400 area veterinarians in it s 42 County Sanitary Veterinary and Food Safety Directorates (Bucharest included). At the local level ANSVSA has contractual arrangements with about 2800 private veterinarians. Three public institutions are affiliated to ANSVSA: (1) the Institute for Diagnosis and Animal Health (IDAH), (2) the Institute for the Control o f Biological Products and Veterinary Drugs, and (3) the Institute for Veterinary Hygiene and Public Health (IVHPH). In addition, ANSVSA also controls the border inspection posts (BIPs). (A93a).

Since the first outbreaks in 2005, several measures have been taken by the Romanian Government to prevent, control and eradicate Avian Influenza in the country. A chain of command was promptly set up to manage the crisis at central, county, and local level based on the indications of the Contingency plan (CP). A permanent National Disease Command Centre (the "Central Anti-Epizootic Command Centre") (CAECC) and local disease command centres made of the deputy director of the County Sanitary, Veterinary and Food Safety Unit and several AI experts have been established through Order No. 146/2005 (A275, A93a). On May 26 2006, the Prime Minister established a National Centre for the Coordination of the Fight against AI, chaired by the president of ANSVSA (National Sanitary Veterinary and Food Safety Authority), comprising representatives of 6 ministries and technical experts, and functioning as an advisory body to the CAECC (A93a). In addition, the Command Centre was assisted by a Crisis Cell which remained operational until the quarantine was lifted and the poultry farms were repopulated. (A93a). Together with the National Commission for Defence against Disasters, responsible for the definition of the overall policy framework for disaster prevention and response, the AECC was created to direct the intervention policy (A275, A93a).

At central level the Veterinary service of the ANSVSA is the CA (Competent Authority) directing the technical measures being taken against the epidemic of avian influenza and is the only authorised institution to make international notifications on animal diseases. At the time of the outbreak an epidemiological cell was temporarily based at the National Reference Laboratory (NRL) to coordinate the technical activities. (A275).

5.4.2. Cost of prevention and control systems

A national plan of intervention in case of a flu pandemic and a contingency plan for avian influenza, approved by the European Commission in December 2006 (Commission Decision, No 2007/24/EC, approving contingency plans for the control of avian influenza and New Castle disease; 22 December 2006), are in place in Romania but the extension and the cost of the overall projects are unclear.

After the first confirmed outbreak, immediate support was provided by international organisations and programs are currently in place to strengthen AI surveillance and reporting systems (A236b). Through a FAO/German Trust Fund project, Germany allocated US$ 141,000, for a 6-month project which ended in May 2006, to provide emergency assistance to control Avian Influenza in Romania (A 42), while in November 2006 the EU allocated 105,000 Euro to improve the surveillance for avian influenza in the country[134].

In August 2006 the World Bank approved a loan to Romania over the 11/2006-8/2009 period in the amount of Euro 29.6 million (US$ 37.7 million) under the GPAI programme to support a national program to increase Romania’s avian and human influenza preparedness. The project allocated Euro 14.3 million (39%) for Animal Health, Euro 19.80 million (54%) for Human Health; Euro 1.641 million (4%) for Public Awareness and Communications and Euro 1.824 million (5%) for support, monitoring and evaluation (A93a). The Animal health component includes 4 components whose budget details are provided in **Table 20**.

Table 20 Romania: Animal Health component of the avian influenza control and human pandemic preparedness and response project

	Amount (EURO million)
Strengthening the Institutional Framework	1.503
Strengthening Disease Surveillance, Diagnostic Capacity and Research	10.878
Strengthening HPAI Control Programs	1.578
Improving Bio-security in poultry production trade	293
TOTAL	**14.252**

Source: Romania WB GPAI/APL

Some 57% of the Animal Heath budget has been allocated to support the improvement of diagnostic capacity. Romania's laboratory capacity has been substantially improved over the past years and is equipped to diagnose all notifiable diseases, including HPAI, at the national reference laboratory (NRL) located at the Institute for Diagnosis and Animal Health (IDAH), but on the other hand the IDAH laboratory is the only BSL-3 facility on the animal health side. (A93a)

The National Reference Laboratory (NRL) has been in charge since the beginning of the outbreaks to confirm through virus isolation the presence of HPAI. It has also been involved in the training of staff especially for the setting up of Polymerase Chain Reaction (PCR) diagnostic units in the county laboratories that have been provided with such technology. Three teams (virology, molecular biology and animal health & traceability) were set up to respond to the emergency and the number of people involved with AI increased from two to forty five. The NRL has also established and reviewed the diagnostic protocols for HPAI. (A275).

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[134] According to this Commission Decision, Romania was allocated Euro 9.72 million in maximum co-funding (50% in most cases) for 2007 for the monitoring, eradication and control of animal diseases. The bulk of this budget has been committed to CSF (5.25 million Euro) and TSE monitoring (2.37 million Euro, for both of which the Commission co-funding rate is up to 100%.

Local laboratories have in general good structures and are well equipped. Since the start of the epidemic, six county laboratories have been provided with PCR facilities. A total of eight laboratories are now equipped with the necessary equipment to carry out PCR or real time PCR testing but training still needed for the staff to improve the use of these facilities. (A93a)

However, given the large number of laboratories spread throughout the country and the abundance of equipment, Romania's veterinary system would benefit from laboratory consolidation and more strategic location. (A93a)

Romania's surveillance system is primarily passive, reacting to reports of disease suspicions and testing dead or sick birds. Active surveillance would be needed to ensure that the disease is detected early enough which would substantially increase the number of samples tested for which the capacity not always exists, especially with respect to consumables such as reagents. Within the GPAI/APL project, Euro 0.188 million has been established to that end.

In case of an AI outbreak, Romania pursues a policy of virus eradication through the immediate destruction of poultry in the infected zone, the establishment of surveillance zones, epidemiological surveys, the complete disinfection of affected areas and the use of sentinel birds before restocking. Culling is performed with plastic garbage containers filled with carbon dioxide but more appropriate containers for asphyxiation purposes in an animal welfare-acceptable manner would be needed for the culling operations as well as mobile incineration units for safe disposal of carcasses (A93a).

Financial compensation for culling is paid within 60 days through the provisions of a national fund "Compensation for Animal Diseases" allocated in the Ministry of Agriculture (MAFRD) budget. The amount of compensation payments are based on the replacement value equalling the market price of the destroyed animals or by estimating the total losses incurred by the holder. Initial budgetary allocations for payments compensating farmers for culling/slaughtering in order to prevent animal diseases (such as avian influenza, swine fever, foot and mouth disease, etc.) amounted to about EUR 2.0 million in MAFRD's 2005 budget and EUR 5.5 million in the 2006 budget. Since the first outbreak of HPAI in Romania in October 2005, total compensation payments for culled poultry have added up to EUR 3.9 million out of which EUR 3.2 million were paid in 2006. Average compensation payments amounted to RON 20 (EUR 5.7) per each hen culled (hens representing 80% of the total poultry culled) to about RON 60 (EUR 17) per each turkey culled. Speedy payment of compensation appears to have substantially contributed to the acceptance of culling activities by the rural population. (A93a).

Despite the effectively control of HPAI outbreaks, weaknesses still remain. The WB assessment has identified those to lie particularly in the areas of quarantining, culling of infected and at risk poultry and the safe disposal of poultry carcasses. In order to support the disease control measures, the GPAI/APL programme allocated EUR 1.475 million for targeting virus eradication at the source which includes the above mentioned measures, EUR 0.103 million to implement poultry vaccination campaigns and EUR 0.29 million for improving bio-security especially in small holders farms. In the context of a shift from passive to active surveillance, the project will also support with EUR 2.23 million the development of an animal disease information system to collect the epidemiological information to set up a properly disease control strategy and sharing the information with the international agencies.

5.4.3. Costs of outbreaks

Official conservative estimates have put the total economic losses due to HPAI since the beginning of the outbreaks at an amount of EUR 192 million. This figure excludes costs, for which official quantitative estimates (in the form o f official statistics or formal reports and claims) are not available. Actual losses are therefore likely to be under-estimated by this figure.

The public expenditures incurred as a consequence of HPAI outbreaks in the period October 2005 to May 2006 alone are summarised in **Table 21**.

Table 21 Romania: some direct costs of HPAI outbreaks (a)

	Government expenditure (Euro million)
Outbreak operations (disinfection, culling, incineration)	5.7
Compensation to poultry producers	3.9
Vaccination of civil population and security forces	1.0
Preventive medication, anti-viral drugs (Tamiflu)	0.2
Sanitary and protection equipment, information campaign	0.3
Road and railway disinfection	45.2
TOTAL	**56.3**

(a) Includes public expenditure incurred during the October 2005 to May 2006 period. Excludes certain expenditures for which no official data available.

Source: official statistics (A93a)

In addition, the private sector suffered important economic losses. For the poultry sector, these are estimated at around EUR 70 million, coming from depressed prices (down by 41%), drop in demand (down by 22%), extra-storage costs (up by 18%), lost export opportunities (down by 14%), extra-disinfection costs (up by 14%), and delays in the production flows. The Federation o f the Employers in the Romanian Tourism estimates that the tourism sector losses caused by the outbreaks could be up to EUR 50 million in the period from October 2005 to March 2006 alone. In addition, poultry holders suffered losses from lost production during an average period of 6 weeks after infection, culling, and disinfection. These losses have been estimated at about EUR 1.5 million since October 2005. More generally, the AI outbreaks in Romania have demonstrated the extreme susceptibility o f the sector to the market collapse caused by loss of consumer confidence.

The WB GPAI/APL project has thus concluded that there are clear cost benefits in improving prevention and control of HPAI.

5.4.4. Comparison of prevention versus outbreak costs

In the case of Romania, no cost-benefit analysis as such of Romania's prevention and control strategies appears to exist currently in the reviewed literature. Nonetheless, important conclusions can be drawn in this direction from a comparison of prevention to outbreak costs.

The animal health component of the WB Integrated plan for HPAI control for 2006-9 comes to a total US$ 14.3 million over a 3 year period (**Table 20**). Of this total, some US$ 1.6 million is earmarked for control (culling and compensation activities) in the event of an outbreak. Excluding this provision, total prevention and control activities as such (during 'normal times') come down to US$ 12.6 million. The largest component of this plan is strengthening disease surveillance, diagnostic capacity and research which accounts for US$ 10.9 million over the 3 year period. Strengthening the institutional framework attracts some US$ 1.5 million, and finally biosecurity US$ 0.3 million.

Against these figures, the analysis of existing data suggests that direct costs of the 2004-05 HPAI outbreaks (including culling and control costs, excluding consequential on-farm losses) amounted to Euro 56.3 million during the 6 month period between October 2005 and May 2006, or roughly US$ 67.6 million [135] (**Table 21**). Official conservative estimates have put the total economic losses (direct and indirect) due to HPAI since the beginning of the outbreaks at an amount of EUR 192 million (or US$ 230.4 million). These losses the various indirect effects described above, such as ripple effects in terms of fall in demand/prices and loss of export (official estimates put this at Euro 70 million, or US$ 84 million), and the spill-over effects on tourism (estimated by the tourism industry at Euro 50 million, or US$ 60 million).

Our own estimates of a potential HPAI outbreak occurring in future suggest that, under the scenarios and assumptions presented in section 6, Romania could face total direct costs and losses (including consequential on-farm losses) of US$ 65.3 million a year.

The comparison of the relative scale of the WB prevention plan against the actual and potential outbreak costs involved is depicted in **Figure 15**. It is noted that the WB control and eradication plan's figures are totals over a 3 year period, while the outbreak costs are quoted as amounts during the outbreak time (i.e. covering a six-month period) or, in our projections, annual estimates.

The comparison clearly points to the fact that the potential benefits that can accrue from improving prevention and control are worth several times the investment.

It is noted, however, that this relies on the assumption that a certain investment would result in gains in productivity and export earnings. The extent to which this will occur will depend on the effective design and implementation of the investment, to ensure the effective control of the disease. A risk factor will be the re-appearance of the disease, as is often the case in practice.

The above calculations do not take into account the incremental operational costs involved, which can be a significant part of the cost of strengthening VS.

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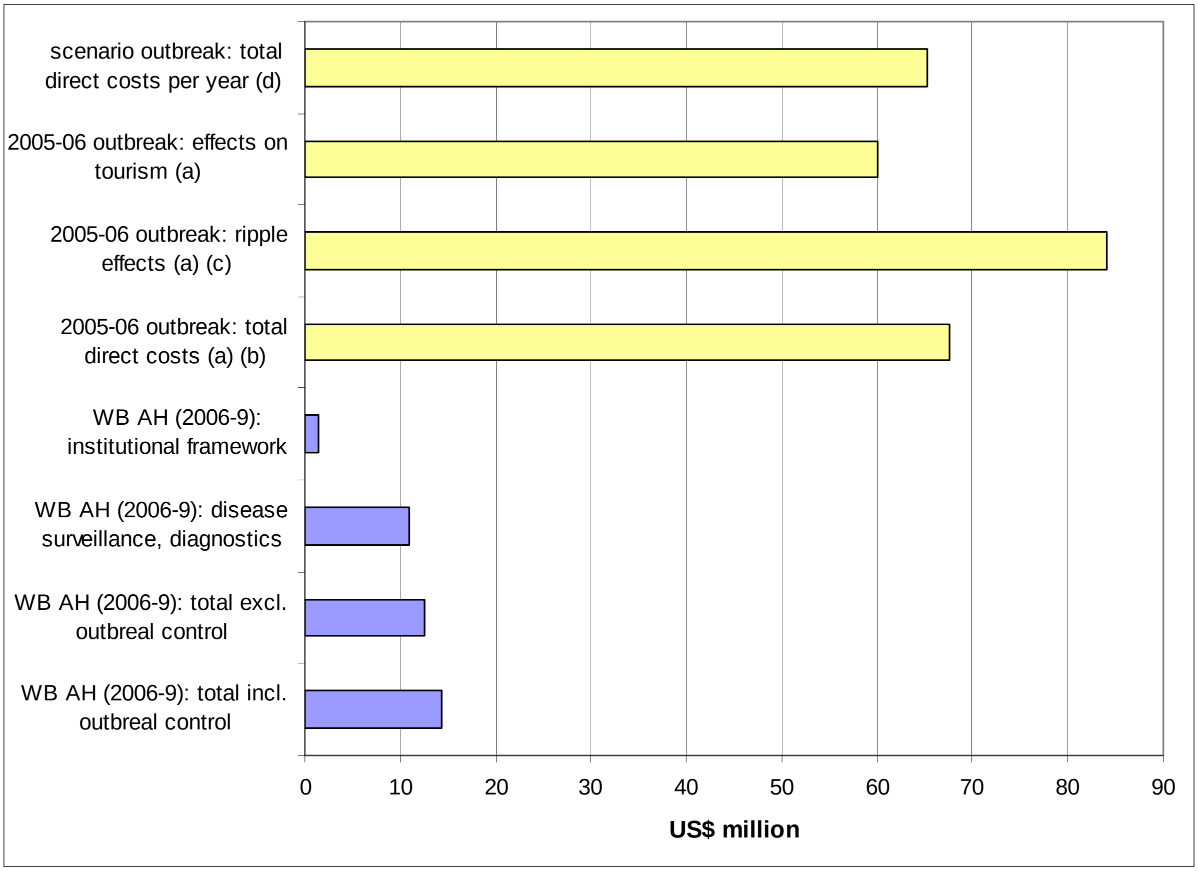
[135] Euro to US$ average exchange rate during October to May 2006

On the other hand, the investment in strengthening the control of a particular disease, e.g. HPAI, can have important spill-over benefits on the entire VS.

Figure 15 Romania: comparison of prevention versus outbreak costs



(a) during the six month period of the outbreaks
(b) excluding consequential on-farm losses
(c) includes price/demand changes and impact on exports
(b) annual; including consequential on-farm losses (source: Agra CEAS projection, Annex 5)

Notes:
WB AH plan's figures are totals over a 3 year period;
Total direct costs (scenario outbreak) are quoted as annual amounts;
Incremental operational costs (a significant part of the total costs of strengthening VS) are excluded from these calculations, due to lack of data.

Source: Agra CEAS Consulting, based on literature and own analysis

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Our analysis in this section leads us to the following conclusions:

Case study: Romania

Romania's VS have undergone significant restructuring and upgrading in the run up to EU accession (Romania became an EU member on 1 January 2007). Having suffered a large number of outbreaks since 2004, this country was relatively recently declared HPAI-free.

Our analysis and comparisons of data on the planned commitments for 2006-09 under the WB integrated plan for the control and eradication of avian influenza, against real and projected costs of the outbreaks, reveal the relative scale of the costs and benefits involved, and the interest in investing further in improved structures and surveillance systems (see Notes*). For example:

- **The total commitment on animal health under the 2006-09 WB plan (excluding control costs in the event of an outbreak) comes to some US$ 12.6 million for the 3 year period (or an average US$ 4.2 million per year), while the direct costs from the outbreak in the six months of 2005-06 outbreak alone were estimated at US$ 67.6 million, excluding consequential on-farm losses (Figure 15).**
- **Investing in strengthening disease surveillance and diagnostics would cost a total US$ 11 million over the same period, or US$ 3.6 million a year which is less than 0.5% of the above conservative estimate.**
- **The relative scale of this investment is even more evident when adding some ripple and spill-over effects, bringing the total impact at some US$ 211.6 million, as a consequence of the effects of the October 2005 to May 2006 outbreak.**

* *Notes: These benefits assume that a certain investment will result in productivity gains and exports. The scale of the benefit is conditional on the effective design and implementation of the investment to be undertaken, leading to an effective control of the disease (eradication is questionable as there is a significant risk factor that the disease would re-appear, as has been the general experience. The above calculations do not take into account the incremental operational costs involved, which can be a significant part of the cost of strengthening VS. On the other hand, the investment in strengthening the control of a particular disease, e.g. HPAI, can have important spill-over benefits on the entire VS.*

6. Global overview

6.1. Overall approach and objectives

We have structured the overview as a global analysis of prevention costs versus outbreak costs. While the costs of prevention are relatively well documented in the estimates provided, for example in the case of HPAI by the competent international bodies on their worldwide needs assessments (section 4.2), the world wide direct and indirect impact of an animal disease has not yet been analysed as such. Estimating these costs would allow drawing conclusions on the expected potential benefits of investing in improved prevention, as well as on the anticipated scale of the direct production control costs and losses which is of use to part II of the analysis.

To fill this gap, we have developed a specific analytical tool incorporating a baseline, scenarios and assumptions on key parameters from which to estimate the detailed direct and indirect costs of a disease outbreak.

It is important to note that the aim here has been to develop a flexible tool, rather than solely providing estimates as such. This means that the baseline, the assumptions and the scenarios can be improved/refined at any point in time, as further research and evidence on a disease impact becomes available. This tool allows a flexible approach, which highlights the relative importance of the various direct and indirect impacts, so as to provide direction to policy-making in this field.

In this report this tool has been developed specifically for the case of HPAI, but it has the potential to be adapted for application in the case of other TADs. In the case of HPAI, the available research to date as well as the nature of the disease and its economic impacts allows a more detailed approach for the calculation of worldwide direct and indirect impacts. In the case of FMD, the available evidence is largely sporadic, in that it is based on specific measures and countries/regions, and is therefore heavily dependent on specificities which do not allow sensible extrapolations to be made at a world level (as discussed in section 4.4). However, this tool could be easily adapted to derive estimates of the worldwide effects of FMD when such research and evidence becomes available. In the meantime we have used the experience of Argentina and the wider Latin America region from our case study, to draw some conclusions on prevention versus outbreak costs.

6.2. Economic analysis of outbreak costs

The analytical tool, as developed and applied in the case of HPAI, is attached as a separate spreadsheet file (**Annex 5)**. The following sections describe the parameters used, the applied baseline, scenarios and assumptions, and the derived estimates[136].

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[136] The layout of the spreadsheet is detailed in the "READ ME FIRST" worksheet.

6.2.1. Key parameters

For the analysis of outbreak costs we differentiate between direct and indirect, further broken down by cost sub-category, according to the typology presented in **Table 2**.

Direct costs and losses are calculated in detail per country – member of the OIE[137] and then these are added to obtain the estimate of global direct costs and losses. These costs are also summarised according to country income levels, which is important in the context of the analysis carried out in Deliverable 2[138].

Indirect costs are calculated at a global level (including all developing/transition countries which are members of the OIE). In this case, the available data and the applied methodology do not allow a more detailed breakdown per country.

A range of parameters is used to calculate each type of cost, as follows (**Table 22**):

Table 22 Parameters used in global economic analysis of outbreak costs

Direct production costs and losses:	
Direct losses	e) Number of poultry lost (died from the disease or culled) f) Average market value per head of poultry (pre-outbreak) g) Culling and disposal costs per head of poultry h) Control costs per head of poultry
Consequential on-farm losses	i) Farm income from activity per head of poultry j) Duration of farm business disruption
Indirect costs:	
Ripple (a)	• Fall in domestic poultry prices • Fall in domestic sales • Fall in world poultry prices • Fall in world poultry trade (exports) • Duration of the above impacts
Spill-over (b)	• Loss in world tourism income value • Duration of the above impact
Wider society (c)	• Loss in global GDP in the event of a human pandemic.

(a) Total net impact on domestic and international markets: depends on impact of outbreak on consumer demand and price levels and proportion of producers/production affected; unaffected producers/countries may actually gain from higher prices. Excludes other potential ripple effects, notably the impact on agricultural input sectors, due to lack of evidence/data.
(b) Costs to the economic sectors of tourism/travel only covered here. Other potentially affected economic sectors (e.g. services) excluded, due to lack of evidence/data.
(c) Economic impact based on the public health effects of a pandemic influenza. Excludes other potential impacts, such as environmental effects, due to lack of evidence/data.

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[137] Within the scope of the ToR for this study, as outlined in section 3.2.

[138] As direct costs and losses are calculated per country, it is possible to summarise costs according to any of the clusters presented in section 3.2.

These parameters are outlined in more detail the "*Assumptions outbreak costs*" worksheet of **Annex 5**.

6.2.2. Scenarios and assumptions

Our estimations start from a baseline which contains data derived from the combined analysis of literature review and the case studies. In particular, the baseline on direct outbreak costs includes data from the case studies on Vietnam and Nigeria but also developments in other parts of the world and global developments as documented in the literature. The baseline on indirect outbreak costs is largely based on the available evidence of world developments from the existing literature. The baseline is summarised in the "*Assumptions outbreak costs*" worksheet, and further detailed in the "*Vietnam HPAI*", "*Nigeria HPAI*", "*global HPAI*" and "*pandemic effects*" worksheets (**Annex 5**).

Assumptions are made in order to extrapolate from the baseline to the country 'clusters'. At a general level, these assumptions include duration of the impact (which depends on the duration and re-occurrence of the epidemic), the rate of disease spread and the coverage (in terms of countries). At a cost-specific level, assumptions are made on the key parameters that define each type of cost. In the case of direct production costs and losses, these include the extent of poultry population loss, market value, culling/disposal costs, and control costs per head of poultry, and loss of income from business disruption (as indicated above).

A total of six scenarios have been formulated, as indicated in **Annex 5**:

- At a country level, **scenario 1 ("most likely")**, **scenario 2 ("low impact")** and **scenario 3 ("high impact")** vary in terms of the duration of the impact of the epidemic and the intensity of disease spread within countries.

- At a global level, **scenario A**, **scenario B** and **scenario C** are formulated on the basis of the geographical coverage of the disease worldwide, with scenario A including only H5N1 infected countries, scenario B infected and 'non infected at immediate risk' countries, and scenario C all developing/transition countries that are members of the OIE[139].

The following comments can be made concerning the assumptions made on the various parameters.

Markets (prices and trade):

We have taken developments in world poultry markets since the 2003/04 outbreaks as the baseline on which the assumptions have been built. The most likely scenario closely follows the real market developments depicted by the baseline. It is important to note that all assumptions are made in terms of the overall net impact, as price falls and sales decline for the affected producers/countries have generally resulted in gains in price and sales increases for producers/countries that have managed to stay free from the disease (as discussed in section 4.3.).

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[139] This classification has been adjusted from reference A40, the Global Strategy for Progressive Control of HPAI (November 2005) and A42, Avian Influenza Control and Eradication: FAO proposal (March 2006), with an update of the current situation from OIE WAHID database (February 2007).

We differentiate between prices in local/internal markets, and prices in international markets (world market price). The former is used for the calculation of the loss in poultry value and for the lost income per head of poultry; the latter is used for the calculation of the export market loss.

The world market price for poultry has experienced significant swings in the last 2 years, following the AI outbreaks (FAO poultry meat outlook). At the onset of the outbreaks in 2004, lagging consumption in Asia and the loss of export markets for regional supplies led to an 8% decline in international trade. Over two years, as countries free from the disease moved to fill the gap in supplies, poultry prices in international markets rose by over 30%. Market developments since late 2005, however, have dramatically changed price developments in international meat markets. In particular, AI outbreaks in approximately 40 previously unaffected countries, many of which are the major poultry consuming and importing countries of Europe, the Middle East, and Africa, have prompted a decline in the FAO world poultry price index by 22% (A111d). Plummeting consumer demand in a context of adequate supplies has continued to put poultry prices under considerable downward pressure in the short term. The duration and overall extent of the market impact of the more recent AI outbreaks will heavily depend on currently erratic consumer perceptions about human health risks.

In view of these real market developments[140], in our analysis we have taken a baseline world price that is the average of the 2006 level for the US, Brazil and Europe (i.e. the main world poultry exporters accounting for over 80% of global trade). Our assumption is that, in the most likely scenario, an AI outbreak would cause shocks in world markets lasting 2 years. We have therefore assumed that prices would fall by an average 20% over a 2 year period (thereafter recovering to pre-outbreak levels), and world exports would fall by an average 10% over the same period before recovering to pre-outbreak levels. In the low impact scenario, the duration of the impact is shorter (1 year) and the extent of the fall smaller.

These scenarios and assumptions are summarised in the "*Assumptions outbreak costs*" worksheet of **Annex 5**.

6.3. Estimates of outbreak costs

6.3.1. Direct impact

Cost estimates in the event of an HPAI outbreak are presented as a range between nine possible outcomes from a combination of the 6 scenarios outlined above ('most likely', 'low impact' and 'high impact', and A, B and C on the geographical country coverage).

Global estimates of the direct production costs and losses (excluding consequential on-farm losses), under the 'most likely scenario' for each of the 3 scenarios of geographical country coverage (A, B, and C), are presented in **Table 23**. Similarly, global estimates of total direct costs including consequential on-farm losses under the 'most likely scenario' are presented in **Table 24**.

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[140] This was based on information and data available at the time of the analysis.

The estimates allow us to draw some general conclusions on the structure of these costs, as depicted in **Figure 16**. The importance of poultry value losses (80% of total direct production costs and losses) and of consequential on-farm losses (55% of the total direct impact) is in particular highlighted.

The range of outcomes under the different scenarios (‘most likely’, ‘low impact’ and ‘high impact’, and A, B and C on the geographical country coverage) are summarised in **Figure 17**. As can be seen, the results for scenarios A and B tend to be very similar, reflecting the relatively small number of countries added in scenario B, given the current state of HPAI outbreaks worldwide. If this position changes, with a more substantial geographical spread of the disease, then the impact would start moving closer to the substantially higher figures of scenario C. Thus, total direct costs and losses (excluding consequential on-farm losses) in scenarios A and B are estimated at US$ 5.3 billion and US$ 6.1 billion respectively (on an annual basis), but would rise up to US$ 9.7 billion if the disease were to spread throughout the developing world. Including consequential on-farm losses, the total direct impact would be US$ 11.7 billion and US$ 13.5 billion respectively in the case of scenarios A and B, but could rise up to US$ 21.3 billion if the disease was to spread more worldwide along the lines suggested by scenario C. It is noted that in all cases, the impact is not proportionate to the number of countries added under subsequent each scenario, because the countries of scenarios A and B account for 55% and 63% respectively of the poultry stock of all developing OIE country members.

Similarly, the most likely scenario depends on the assumptions made on the various parameters as the situation currently stands (markets/prices, duration of impact, size of poultry sector affected etc.), in other words it represents the most realistic potential outcome with the information currently available. If this situation changes, this would affect the assumptions made on the key parameters such as the duration of the impact, the size of the poultry sector affected, the effect on consumption, markets and prices and so on. Thus, if the situation becomes less critical, then the potential outcome would start moving towards the ‘low impact’ scenario; conversely if the situation becomes more severe, then the potential outcome would start to approximate to that of the ‘high impact’ scenario (**Figure 17** and **Figure 18**). For example, taking scenario A, total direct costs and losses (excluding consequential on-farm losses) in the ‘low impact’ scenario come down to US$2.5 billion and the ‘high impact scenario rise to US$ 8.9 billion (all figures on an annual basis), compared to US$ 5.3 billion in the ‘most likely’ scenario. Including consequential on-farm losses, the total direct impact would be US$ 3.5 billion in the ‘low impact’ scenario and US$ 30.3 billion the ‘high impact scenario (compared to US$ 11.7 billion in the ‘most likely’ scenario).

Table 23 Estimated global impact: direct costs and losses (a) (in '000 US$), HPAI

	Impact: scenario 1 (most likely)			
	Poultry value losses	**Culling/ Disposal costs**	**Control costs**	***Total impact (a)***
Direct production costs/losses: Global impact, annual (i)				
scenario A (ii)	***4,271,540***	***747,519***	***320,365***	***5,339,425***
scenario B (iii)	***4,898,934***	***857,313***	***367,420***	***6,123,668***
scenario C (iv)	***7,763,260***	***1,358,571***	***582,245***	***9,704,075***
Direct production costs/losses: Global impact, total (i)				
scenario A (ii)	***8,543,080***	***1,495,039***	***640,731***	***10,678,850***
scenario B (iii)	***9,797,868***	***1,714,627***	***734,840***	***12,247,335***
scenario C (iv)	***15,526,520***	***2,717,141***	***1,164,489***	***19,408,151***

(a) Includes animal value losses, culling/disposal and control costs

(i) The 'global' impact is given in a range, depending on 3 scenarios in terms of country coverage (scenarios A to C). Furthermore, it is indicated per year and in total, depending on the assumptions for duration of the epidemic

(ii) Scenario A includes the following countries: Cambodia, China, Indonesia, Laos, Thailand, Vietnam, S. Korea; Mongolia, Kazakshtan, Russia, Turkey, Romania; Nigeria, Niger, Sudan

(iii) Scenario B includes the countries of scenario A plus: N Korea, Malaysia, Brunei, Myanmar, Singapore, Philippines; Bangladesh, Bhutan, India, Nepal, Sri Lanka

(iv) Scenario C includes all developing/transition countries which are members of the OIE (132 countries in total)

Source: *"OIE Del1 global costs analysis.xls"*, Agra CEAS Consulting.

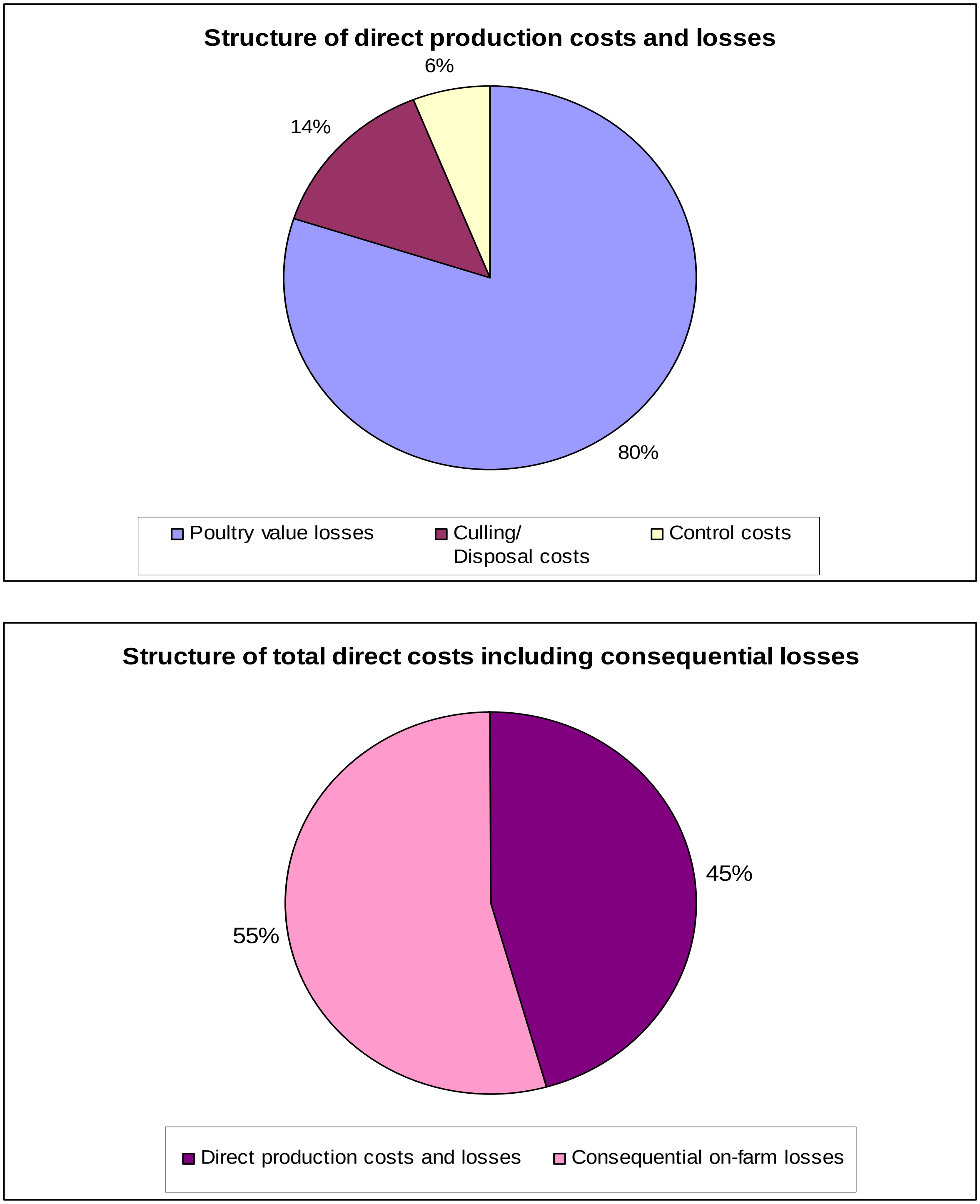
Table 24 Estimated global impact: total direct costs including consequential on-farm losses (in '000 US$), HPAI

	Impact: scenario 1 (most likely)		
	Direct production costs/losses, total impact (a)	**Consequential on-farm losses**	**Total direct impact, including consequential on-farm losses**
Global impact, annual (i)			
scenario A (ii)	***5,339,425***	***6,407,310***	***11,746,734***
scenario B (iii)	***6,123,668***	***7,348,401***	***13,472,069***
scenario C (iv)	***9,704,075***	***11,644,890***	***21,348,966***
Global impact, total (i)			
scenario A (ii)	***10,678,850***	***12,814,619***	***23,493,469***
scenario B (iii)	***12,247,335***	***14,696,802***	***26,944,137***
scenario C (iv)	***19,408,151***	***23,289,781***	***42,697,931***

(a) Includes animal value losses, culling/disposal and control costs
(i) The 'global' impact is given in a range, depending on 3 scenarios in terms of country coverage (scenarios A to C). Furthermore, it is indicated per year and in total, depending on the assumptions for duration of the epidemic
(ii) Scenario A includes the following countries: Cambodia, China, Indonesia, Laos, Thailand, Vietnam, S. Korea; Mongolia, Kazakshtan, Russia, Turkey, Romania; Nigeria, Niger, Sudan
(iii) Scenario B includes the countries of scenario A plus : N Korea, Malaysia, Brunei, Myanmar, Singapore, Philippines; Bangladesh, Bhutan, India, Nepal, Sri Lanka
(iv) Scenario C includes all developing/transition countries which are members of the OIE (132 countries in total)

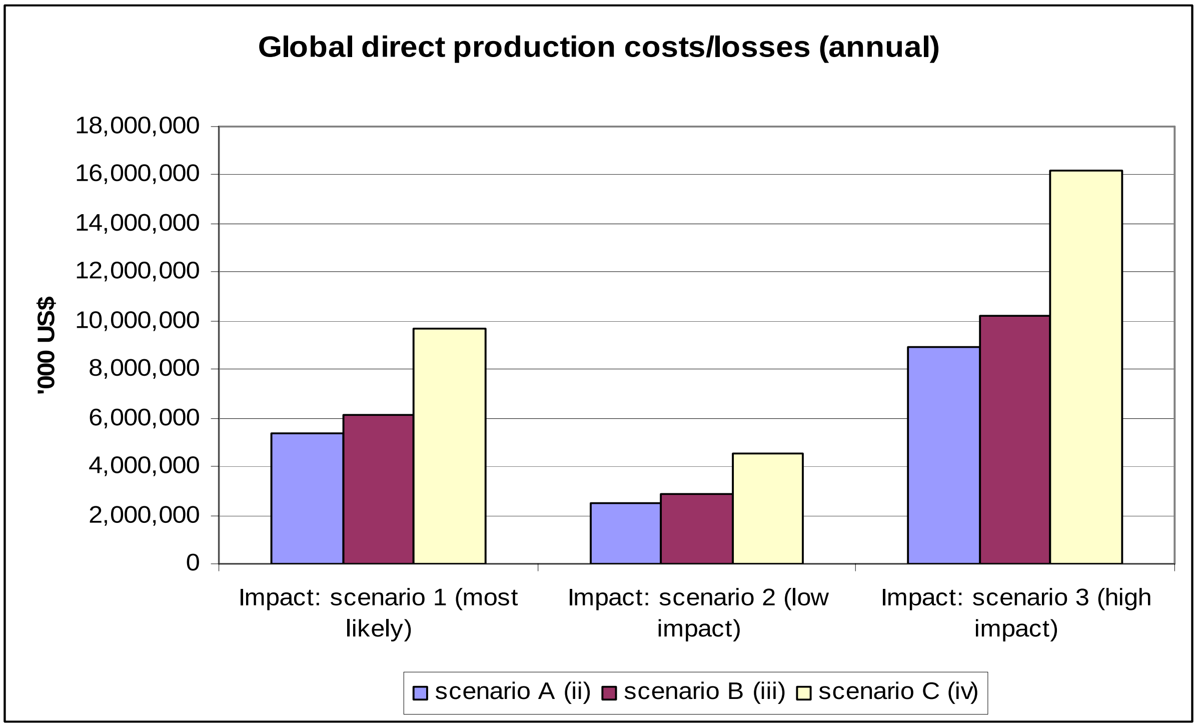
Source: *"OIE Del1 global costs analysis.xls"*, Agra CEAS Consulting.

Figure 16 General pattern of estimated direct impacts, HPAI

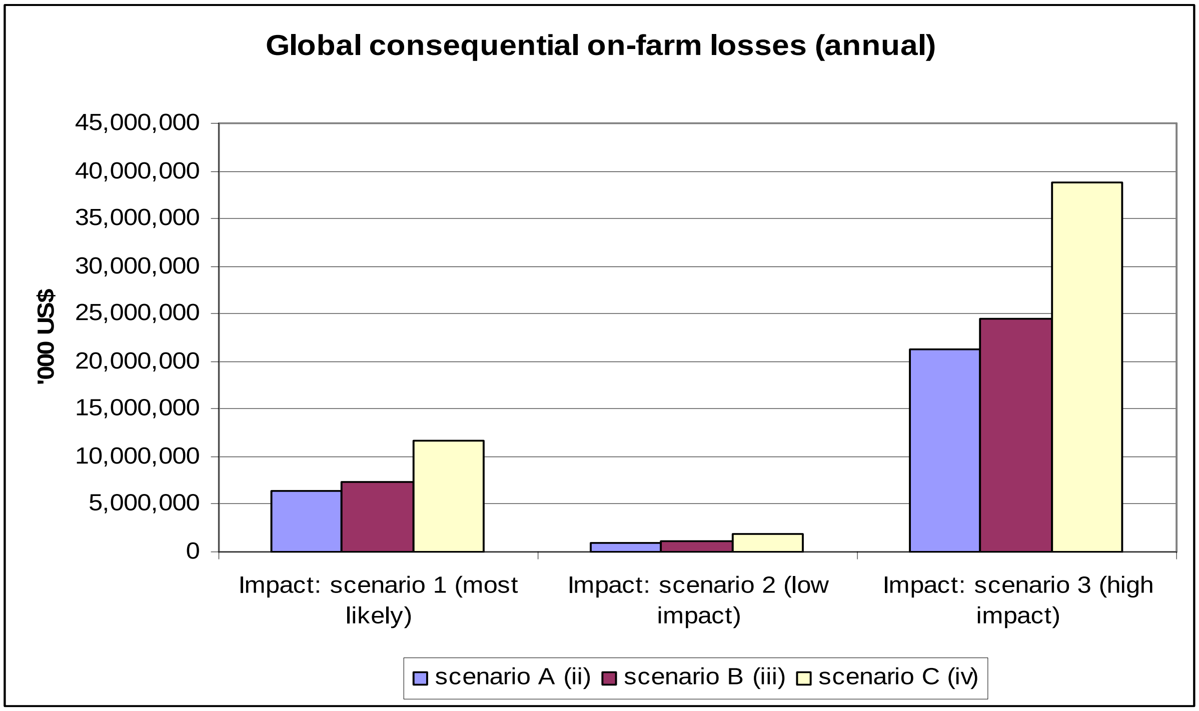


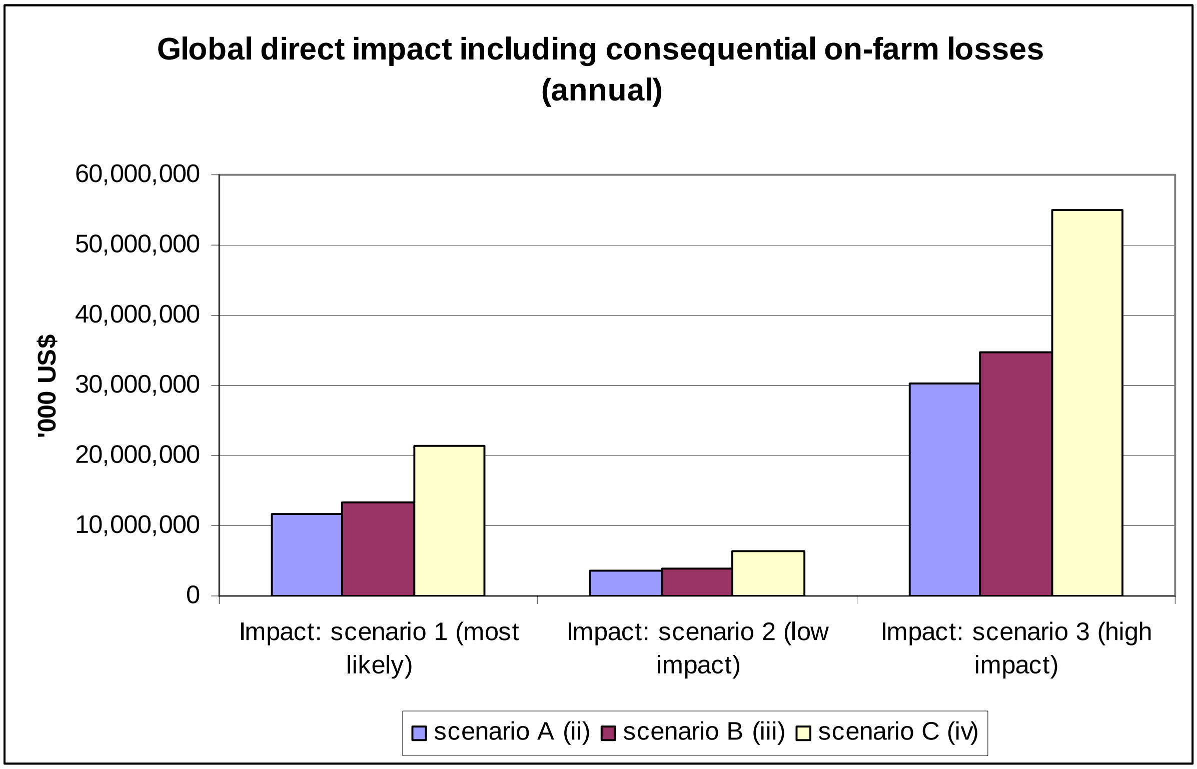
Source: *"OIE Del1 global costs analysis.xls"*, Agra CEAS Consulting.

Figure 17 Overview of estimated direct impacts under the different scenarios, HPAI (i)



Note: Includes animal value losses, culling/disposal and control costs



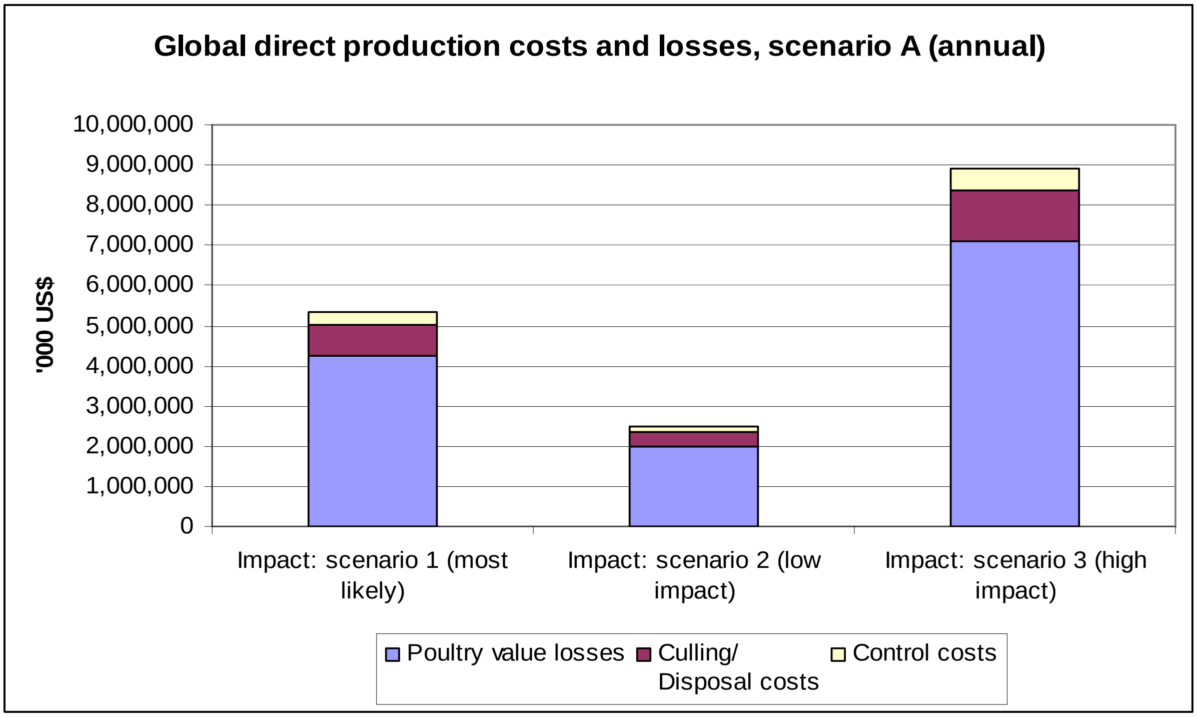


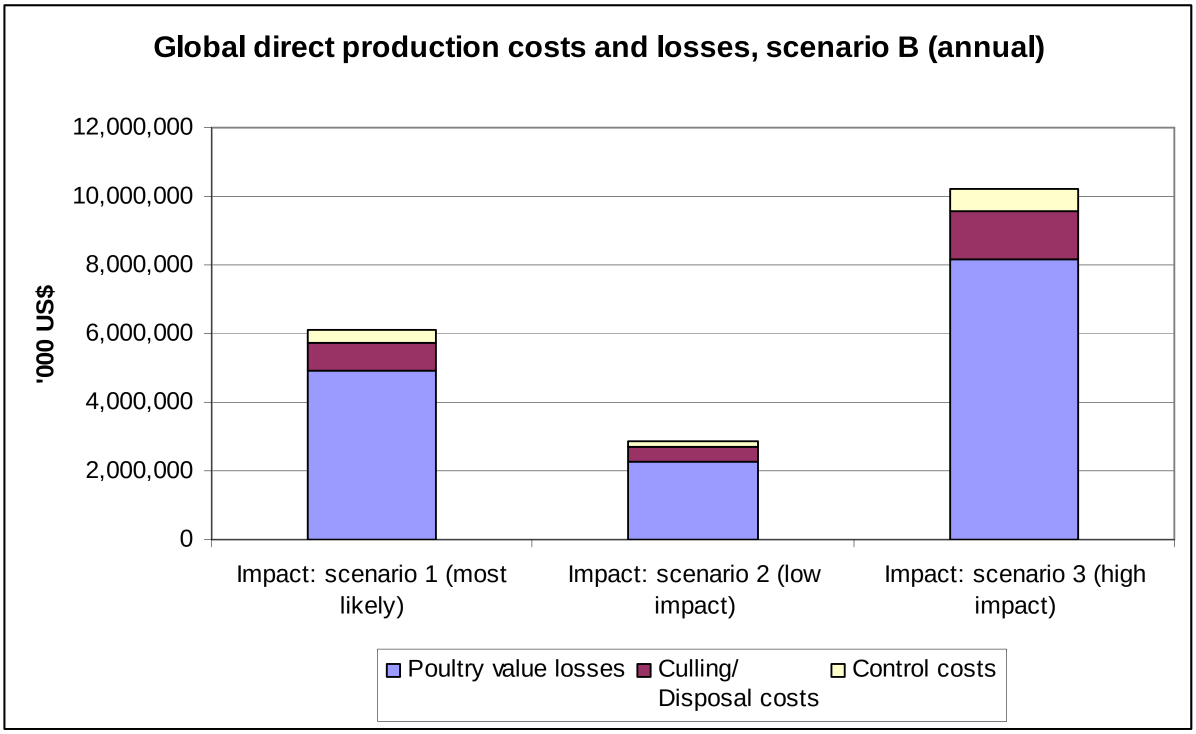
Note: impact presented on an annual basis. For full results see **Annex 5**

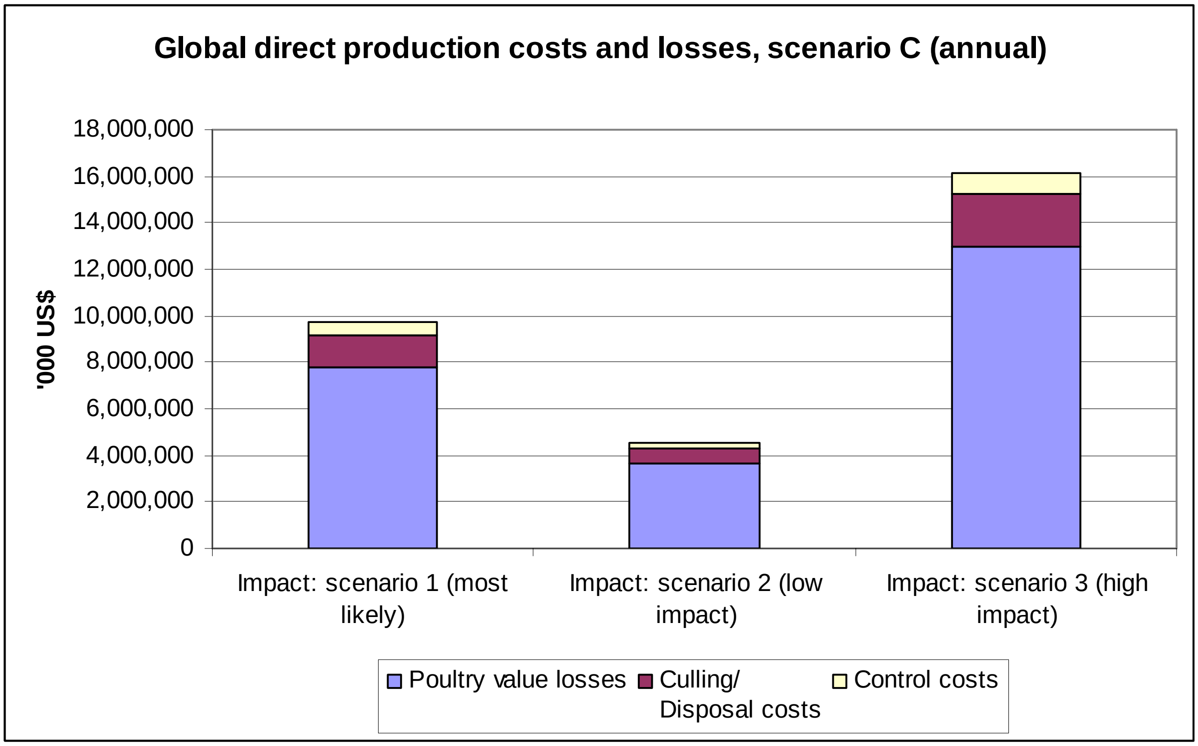
(i) Includes animal value losses, culling/disposal and control costs
(ii) Scenario A includes the following countries: Cambodia, China, Indonesia, Laos, Thailand, Vietnam, S. Korea; Mongolia, Kazakhstan, Russia, Turkey, Romania; Nigeria, Niger, Sudan
(iii) Scenario B includes the countries of scenario A plus: N Korea, Malaysia, Brunei, Myanmar, Singapore, Philippines; Bangladesh, Bhutan, India, Nepal, Sri Lanka
(iv) Scenario C includes all developing/transition countries, members of the OIE (132 countries in total)

Source: *"OIE Del1 global costs analysis.xls"*, Agra CEAS Consulting.

Figure 18 Overview of estimated direct production costs and losses under the different scenarios, HPAI







Note: Impact presented on an annual basis. For full results see **Annex 5**

Source: *"OIE Del1 global costs analysis.xls"*, Agra CEAS Consulting.

6.3.2. Indirect impact

The various indirect costs in the event of an HPAI outbreak have been estimated as a range between 3 possible outcomes from the 3 main scenarios ('most likely', 'low impact' and 'high impact'). Unlike direct costs, it has not been possible to estimate costs per country, therefore it has not been possible to examine scenarios A, B and C on the geographical country coverage. As discussed above, this is due to the complexity of interactions, whereby a loss in one sector may be a gain in another. Thus, the effects given here are an estimated net impact which accommodates for such interactions, based on assumptions taken from the baseline i.e. the experience we have now gained from the global impact on world markets following the AI outbreaks of the last few years.

Global estimates of the indirect impact under the 'most likely scenario' are presented in **Table 25**, on an annual basis and in total terms (i.e. depending on the duration of the impact of the epidemic). Under the 'most likely' scenario, ripple costs are estimated at US$ 5.3 billion in terms of domestic market losses in the poultry sector and a further US$ 3.8 billion in terms of export market losses on an annual basis. Assuming a 2 year duration of impact, as is currently the case under the 'most likely' scenario based on real market baseline trends, the total ripple impact in terms of domestic and export market losses in the poultry sector would be double the above amounts (i.e. US$ 10.6 billion and US$ 7.5 billion respectively).

The considerable extent to which the relative value of spill-over (tourism) and wider society (human pandemic) costs outweigh the ripple effects is highlighted under the different scenarios in **Figure 19**. In the case of spill-over effects in the tourism sector alone, these are estimated to amount to US$ 72 billion on an annual basis under the 'most likely' scenario and double that amount assuming a 2-year duration of the impact (i.e. US$ 144 billion). Wider society costs, in the event of a human pandemic, are several multiples of all costs, and depending on the severity of the outbreak these are estimated at US$ 311.2 billion (at 15% attack rate), and at US$ 711.2 billion (at a 35% attack rate) on an annual basis alone. This is consistent with the approach taken in much of the literature on indirect impacts, where the animal health and human pandemic scenarios of HPAI have been looked at separately (e.g. A43, A90, A210, A261). There is also wide consensus that, the further we move towards spill-over and wider society impacts, the more the picture becomes uncertain and heavily dependent on the underlying assumptions.

It should be noted that these costs are the minimum expected outcome, as they exclude certain types of indirect impacts for which it has not been possible to provide estimates on a global scale. Such impacts include ripple effects on upstream/downstream industries (raw material suppliers, catering and distribution, wholesale markets, employment in the sector etc.), spill-over effects (e.g. on the services industry) and other wider society costs (e.g. environmental effects). Where available, some evidence of these effects on an ad hoc basis has been provided in section 4.3.3, and this suggests that such costs can be fairly substantial. For example, it is estimated that the European poultry feed industry following the AI crisis has seen up to 40% reductions in demand for poultry feed in EU countries (**Table 9**).

In this context, the estimates of total indirect impact provided here should be considered as the minimum potential outcome.

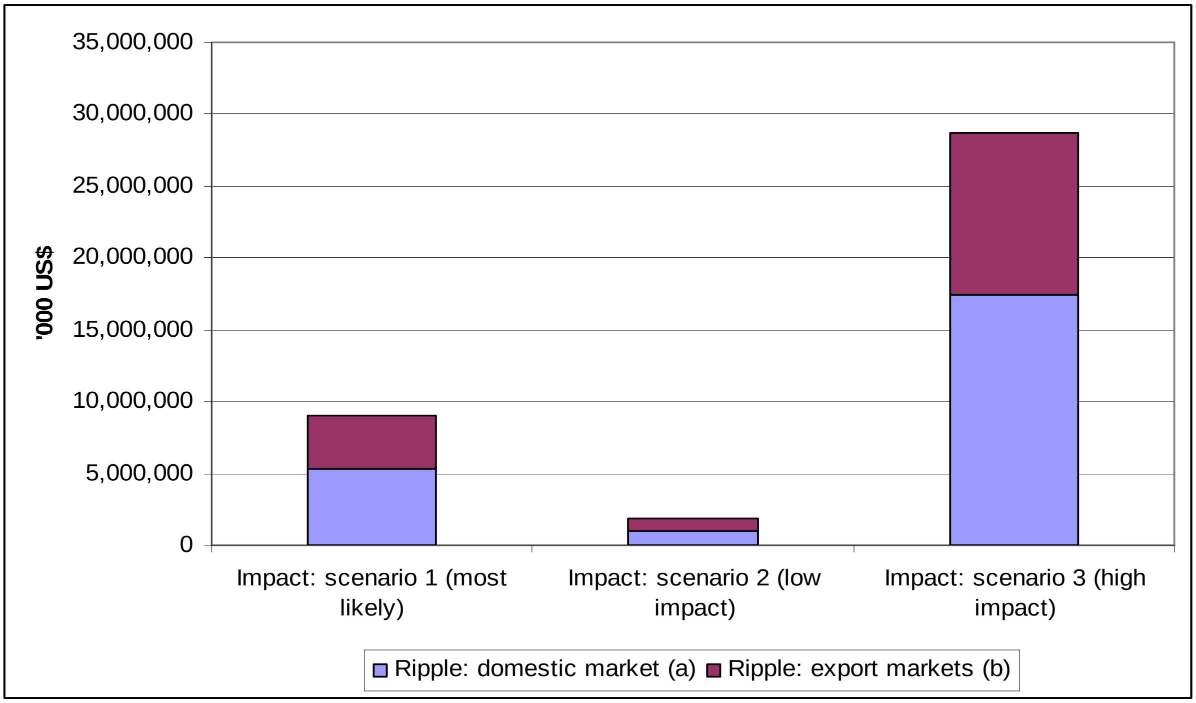
Table 25 Estimated global impact: indirect costs, HPAI

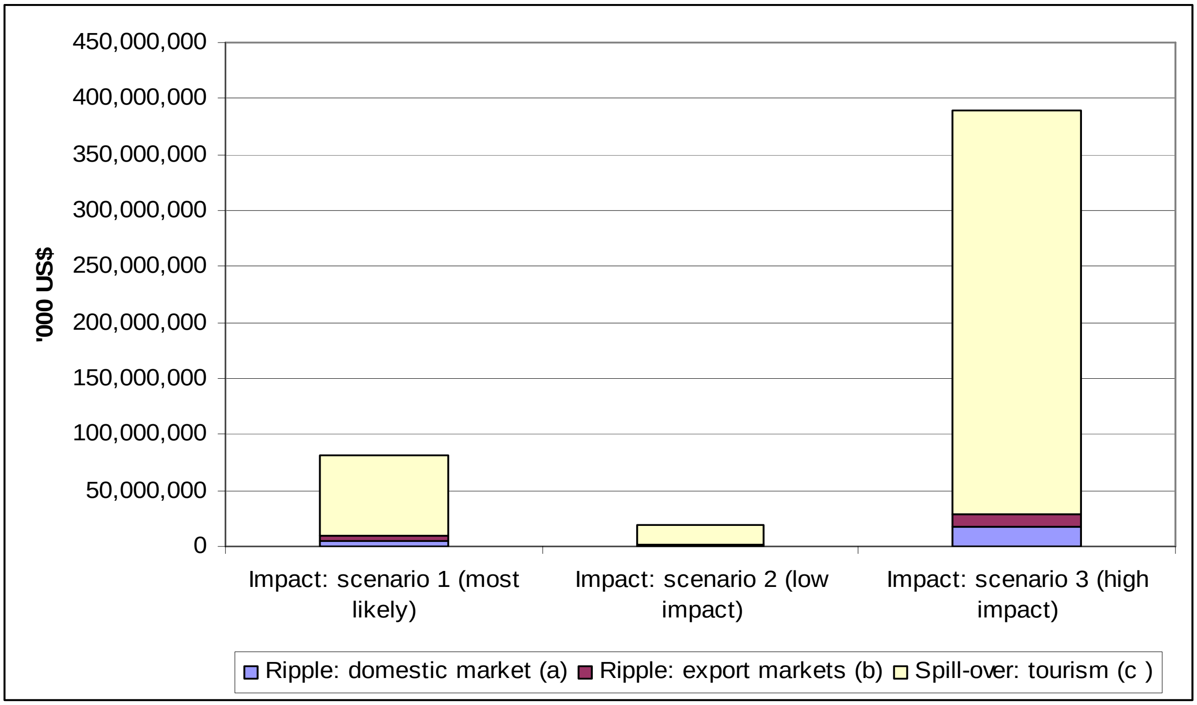
	Impact: scenario 1 (most likely)				
	Ripple: domestic market (a)	**Ripple: export markets (a)**	**Spill-over: tourism (b)**	**Wider society (c)**	***Total impact***
Indirect costs/losses: Global impact, annual (i)	5,279,017	3,774,984	72,000,000	311,150,000	***392,204,001***
				711,200,000	***792,254,001***
Indirect costs/losses: Global impact, total (i)	10,558,034	7,549,968	144,000,000	622,300,000	***784,408,002***
				1,422,400,000	***1,584,508,002***

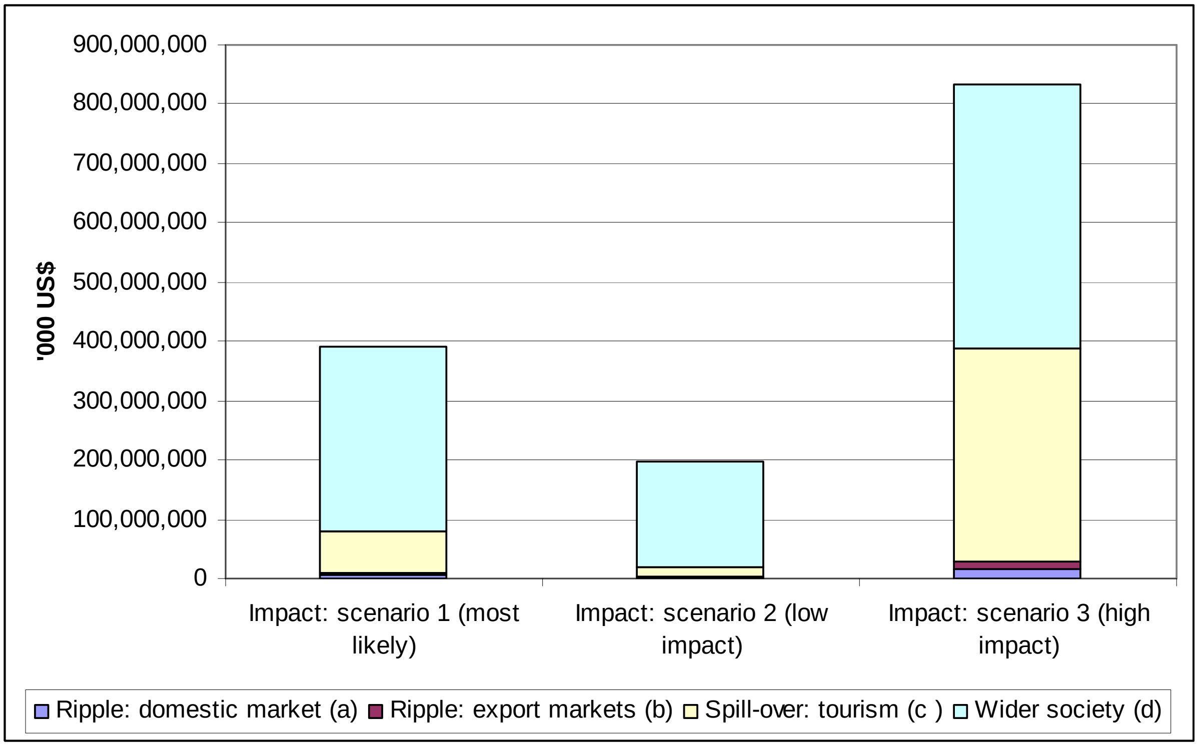
(a) Total net impact on domestic and international markets: depends on impact of outbreak on consumer demand and price levels and proportion of producers/production affected; unaffected producers/countries may actually gain from higher prices. Excludes other potential ripple effects, notably the impact on agricultural input sectors, due to lack of evidence/data.
(b) Costs to the economic sectors of tourism/travel only covered here. Other potentially affected economic sectors (e.g. services) excluded, due to lack of evidence/data.
(c) Economic impact based on the public health effects of a pandemic influenza. Excludes other potential impacts, such as environmental effects, due to lack of evidence/data. Low value assumes 15% attack rate; high value assumes 35% attack rate.
(i) The 'global' impact is indicated per year and in total, depending on the assumptions for duration of the epidemic.

Source: *“OIE Del1 global costs analysis.xls”*, Agra CEAS Consulting.

Figure 19 Overview of estimated indirect impacts under the different scenarios, HPAI







Note: Impact presented on an annual basis. For full results see **Annex 5**

(a) Total net impact on domestic and international markets: depends on impact of outbreak on consumer demand and price levels and proportion of producers/production affected; unaffected producers/countries may actually gain from higher prices.
(b) Excludes other potential ripple effects, notably the impact on agricultural input sectors, due to lack of evidence/data.
(c) Costs to the economic sectors of tourism/travel only covered here. Other potentially affected economic sectors (e.g. services) excluded, due to lack of evidence/data.
(d) Economic impact based on the public health effects of a pandemic influenza. Excludes other potential impacts, such as environmental effects, due to lack of evidence/data. Low value assumes 15% attack rate; high value assumes 35% attack rate.

Source: *"OIE Del1 global costs analysis.xls"*, Agra CEAS Consulting.

6.4. Comparison of prevention costs to outbreak costs

In the case of HPAI, the most recent global needs assessments of prevention and response to HPAI suggest that some US$ 2.27 billion would be required over a 3-year period (as discussed in section 4.2). Of this amount, prevention and preparedness costs as such account for just over US$ 1 billion (**Table 4**). It is noted that these calculations do not take into account the incremental operational costs involved, which can be a significant part of the cost of strengthening VS.

Against this assessment, outbreak costs under the 'most likely' scenario and for H5N1 countries only are estimated at US$ 5.34 billion per year for the direct production costs and losses alone (excluding consequential losses) (**Figure 20**).

Adding consequential on-farm losses, the total direct impact comes to US$ 11.75 billion per year. Assuming the impact of an outbreak spread over a period of 2 years ('most likely scenario') the total direct impacts would be US$ 10.7 billion excluding consequential on-farm losses and US$ 23.5 billion if these losses are included.

Moving towards scenarios B and C these costs increase further to US$ 12.3 billion and US$ 26.9 billion respectively (in the case of scenario B) and to US$ 19.4 billion and US$ 42.7 billion respectively (in the case of scenario C).

Before even considering the indirect impacts, the benefits of improved prevention by far outweigh the potential outbreak costs and losses.

Adding potential ripple effects (only in terms of the potential losses in domestic and export markets) to the above scenarios would bring the total impact to US$ 41.6 billion over a 2 year period.

The 'benefit' of improved prevention in this case is defined as the potential savings that could/should be made on outbreak costs if an effective prevention and emergency preparedness structure is in place. It is noted, however, that this relies on the assumption that a certain investment would result in gains in productivity and export earnings. The extent to which this will occur will depend on the effective design and implementation of the investment, to ensure the effective control of the disease. A risk factor will be the re-appearance of the disease, as is often the case in practice. It is also noted that as several countries start embarking on improving their prevention and control systems and strengthening their VS, some of these losses would be mitigated; however, the timeframe of the calculations here (2-3 years) is relatively short for such effects to be felt through.

In addition, other benefits include the potential contribution to poverty alleviation, as discussed in section 3.7, given that a significant number of the countries included in these estimates are defined as LDCs or low income countries (**Annex 3**). Under the most likely scenario, in the event of an HPAI outbreak the estimated direct impact (excluding consequential losses) for the LDCs as agroup ranges from US$ 72.6 million in scenario A (only 4 LDCs affected) to US$ 258 million in scenario B (8 LDCs affected) and nearly US$ 600 million if all LDCs were to be affected (scenario C).

Furthermore, the investment in strengthening the control of a particular disease, e.g. HPAI, can have important spill-over benefits on the entire VS.

In the case of FMD, although a complete estimation of outbreak costs and an extrapolation to a world level has not been possible from the ad hoc evidence available, as discussed in section 4.4, existing studies overwhelmingly support the thesis that improved prevention and control (including through the improvement in VS) contributes to significant gains in terms of trade, which justify the investment[141]. This is particularly the case for FMD, but there are also important benefits of this kind in the case of HPAI, as demonstrated by the ripple export markets impacts in the above calculations.

Similar conclusions can be drawn from the analysis of the CBPP and rinderpest campaigns in Africa (section 4.4).

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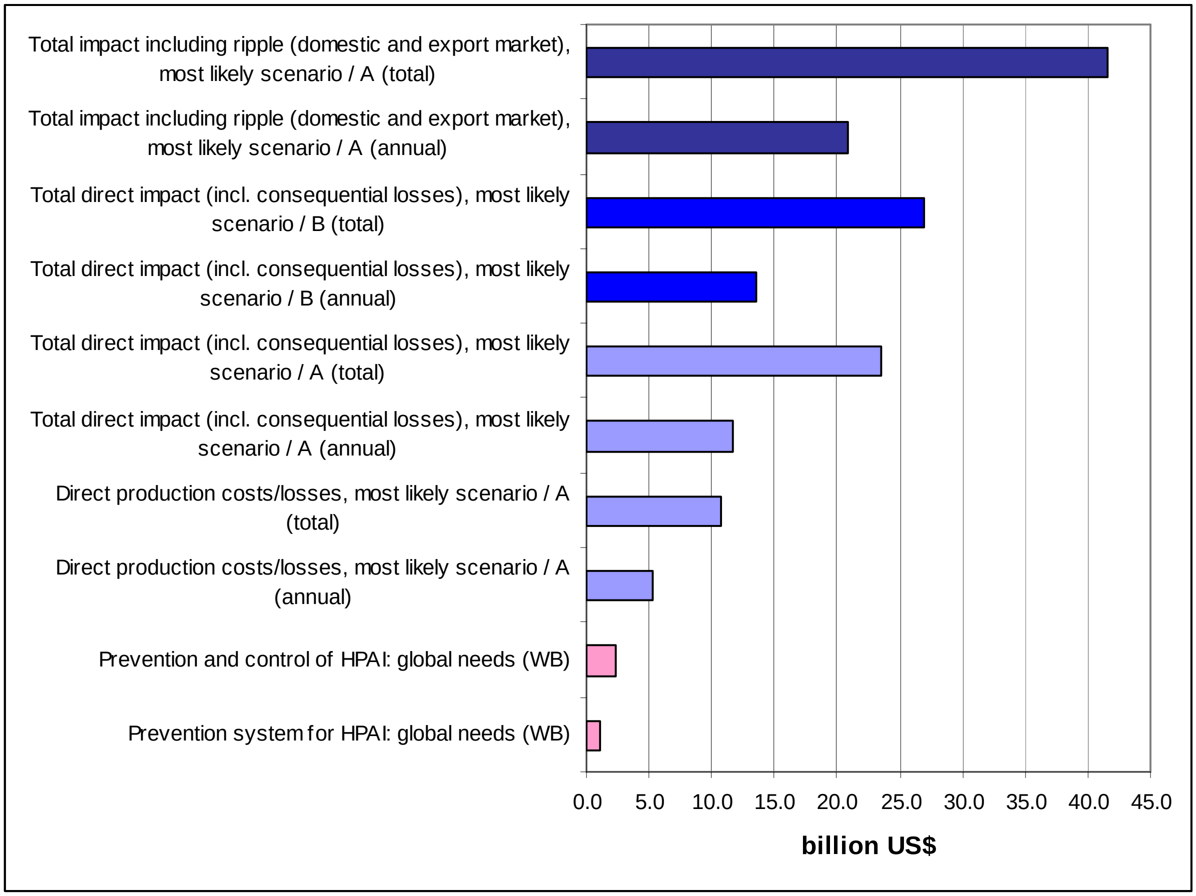
[141] This may not be the case for all developing/transition countries as quality issues and poor marketing channels often act as additional factors to animal health problems, that prohibit some countries from untapping their export potential, where such a potential is available.

Figure 20 Prevention versus outbreak costs: comparison under various scenarios, HPAI



Notes:
HPAI global needs figures are totals over a 3 year period;
Incremental operational costs (a significant part of the total costs of strengthening VS) are excluded from these calculations, due to lack of data;
Outbreak costs are quoted in annual and total amounts (total here refers to the duration of the impact, which is assumed to last for 2 years in the most likely scenario).

Source: *"OIE Del1 global costs analysis.xls"*, Agra CEAS Consulting.

7. Conclusions

It is difficult to predict the severity of the threats posed by Transboundary Animal Diseases (TADs). Moreover, different issues arise depending on the nature of the disease. A disease such as HPAI, with its high public health relevance, poses a different set of challenges than a disease such as FMD which has purely commercial and socio-economic implications. Both diseases, however, have the potential to lead to substantial and even devastating consequences in terms of increased poverty, decreases in food security and social equity/stability in developing/transition countries.

At the same time, the current state of Veterinary Services (VS) and preparedness levels in developing/transition countries pose a real and present threat to the prevention and control of TADs. As is demonstrated in the case studies and from the literature review, the various identified weaknesses essentially revolve around the key issue of the lack of funds and/or poor governance. Within a weaker economic environment and while these countries are struggling to catch up with the rest of the world, it is evident that VS have not been – more importantly have not consistently been – a priority in the use of relatively constrained public funds. Today more than ever, with increasing globalisation, the world's 'developed' and 'developing/transition' countries are so interconnected that both the effects of TADs and the measures to prevent them can not be viewed in isolation. This call for a global approach in the fight against animal diseases, for which there is wide consensus in the reviewed literature that the VS have a crucial role to play as the providers of Global Public Goods.

In the case of HPAI, while significant risk remains that the virus mutates to infect humans, as yet adaptation for human-to-human transmission has not occurred. However, the WHO considers it a probable (rather than a possible) scenario, and the key competent agencies for animal health (OIE/FAO) warn that the greater the shedding of virus from infected poultry the greater the risk of adaptation leading to a human pandemic. It is therefore clear that the disease must be contained efficiently and within a reasonable time frame. This being a transboundary disease, efficient containment can not take place unless all countries in the world are prepared to face a possible outbreak. The worldwide system for the prevention and control of HPAI can only be as strong as its weakest link. To date, the H5N1 has been most prevalent in SE Asia but it has spread relatively quickly to Africa and has made its appearance in the developed world (more recently with the February 2007 UK outbreak).

This raises important strategic questions for policy-makers around the world. A key issue is the extent of the investment that needs to be undertaken to improve current systems to prevent TADs, not only in the specific context of the two diseases examined here (HPAI and FMD) but also more generally.

To determine the appropriate level of investment, in purely economic terms, demands an analysis of the costs of the investment versus the benefits. As discussed in the Report, such an analysis in the strict sense of a CBA methodology has a number of limitations:

- Firstly, this theme requires both detailed epidemiological and economic modelling, for which neither the methodology has been adequately developed nor the necessary data exists.

- Second, in most cases, both the costs and the benefits extend beyond the boundaries of a specific disease. The interrelationships may be too complex to allow clear modelling. For example, general improvements in VS have implications for all diseases, in which case the resulting benefits (e.g. in terms of potential improvements in market access) can not clearly be defined because they can not be attributed to a specific livestock sector that may benefit from these improvements.

- Third, these being transboundary diseases, the potential costs and benefits transcend national borders. In this case too, interrelationships are too complex to readily allow modelling. For example, the improvement of preventive capability in Nigeria should have major implications for neighbouring countries and the region, however relevant policies undertaken in the other countries also impact on the region.

- Fourth, even where the costs and benefits can be examined in the context of a specific measure affecting a specific livestock sector (e.g. improved diagnostic laboratory capacity for HPAI), the resulting benefits are not always tangible or readily quantifiable. For example, in examining the potential benefits that may accrue from the avoidance of a human pandemic, only approximate estimates can be provided.

- Fifth, it is difficult to isolate the potential benefits of the examined investment from other conjectural trends that may influence the outcome. For example, building a new diagnostic laboratory may improve detection of a disease but the likely benefit in terms of – say - the improved trade potential may be undermined by factors such as high production costs, poor marketing/distribution channels, poor infrastructure, trade policies, or the emergence of a new competitor in potential export markets.

- Sixth, even where such analysis has been attempted, results depend heavily on the underlying assumptions and scenarios, and should therefore be interpreted within that context.

The current project has examined the costs of specific measures, recognised by the competent agencies in this field as the minimum requirements for effective prevention and control, and has compared them to the costs of outbreaks in the particular case of HPAI. For the latter, it has developed a detailed model, which estimated the costs per country and extrapolating at global level, under different scenarios and assumptions. The extent of the investment on prevention will depend on preparedness levels in each country, which, as demonstrated in the case studies and the literature review can be extremely variable. Similarly, the extent of the benefit will depend on a range of factors including the duration, severity and geographical scale of the epidemic, economic factors and the potential consequences and scale of a human pandemic.

It is therefore important to view the estimates of prevention costs and outbreak costs in terms of relative scale rather than as absolute figures, and within the context in which they have been produced. For this reason, a range of estimates is provided under a range of scenarios and assumptions, while our most likely scenario is modelled closely on past experience and data from the costs of actual outbreaks (this has been used as our baseline).

It is noted that direct costs and losses, although extensive in themselves, are in fact the smallest element of the overall impact of an outbreak and therefore produce the smallest element of benefit accruing from improved prevention. While direct impacts are relatively easier to determine, indirect impacts are more cumbersome, especially as we move down the list from ripple to spill-over and wider society effects. Results should therefore be interpreted with caution the further we move away from the estimation of direct impacts.

Overall the results clearly demonstrate that the potential costs of an HPAI outbreak are a multiple of the investment required for effective prevention. This suggests that the potential benefit of improved prevention is very substantially higher than the cost of the investment, depending on the underlying scenarios and assumptions. If the effects of a human pandemic are added to the equation, then the economic benefits – beyond avoiding the loss of human lives as such – by far outweigh the costs. Beyond these benefits, there are clear implications in terms of poverty alleviation and food security as the producer costs and losses of an outbreak are disproportionately felt by those most in need: the poorer rural communities of the developing world.

These results have implications for policy-making. An important element of animal health prevention policies is the control of risks at source, hence the advantages of improved prevention in exporting developing countries accrue not just to them but also to importing developed countries. Apart from providing solidarity as such in facing crises and assisting the developing world to come out of the poverty deadlock, the potential benefits that can accrue to developed countries from improved disease prevention and preparedness at source in developing countries is a major argument for the mobilisation of funding from the international community. The nature of the potential costs and benefits also determines the rationale and potential extent of involvement of public and private initiatives in mitigating the effects of an outbreak. These issues are explored in Deliverables II and III.

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Annexes

Annex 1: Transboundary Animal Diseases (TADs): overview of occurrence and prevention/control strategies for major TADs

Disease	Host	Virulence	Prevention and Control	Occurrence of the disease in World (from 01/01/05 to 10/02/07)
Highly pathogenic avian influenza (HPAI)	Probably all domestic and wild avian species are susceptible to infection. Other species can be affected but the infection remains generally unapparent (pig, horse, cats). Humans can become infected from contact with the birds, and death has occurred in some cases (HPAI). However, no human to human transmission yet.	HP viruses cause severe, systemic disease with high mortality in chickens, turkeys, and other gallinaceous birds.	**Generally:** Effective disease surveillance and early reporting of outbreaks Enhance Bio-security at poultry farms Avoidance of contact between poultry and wild birds Border animal movement controls **In the affected outbreak area:** Stamping-out of infected and at risk poultry in the infected area Disposal of carcasses and of their products in a bio-secure manner Quarantine (prohibition to move any animal, animal product, material or equipment) Restriction and control of movements of persons and vehicles Cleaning and disinfection buildings, equipment/materials and premises Allow at least 21 days before restocking (sanitary void) Epidemiological investigation **Around the affected outbreak area:** Stamping out of all poultry (within an area of 3 or 5 km radius), and/or, Vaccination Control of movements of poultry , poultry products and limit the movements of person **In the remaining part of the territory:** Prohibit poultry markets and other gatherings of birds Strengthen the surveillance of poultry farms Strengthen bio-security in poultry farms Strengthen movements controls inside the country and at the borders	Outbreaks have occurred in the following countries: **Sub- Saharan Africa (AFR):** Burkina Faso, Cote D'Ivoire, Niger, Nigeria, South Africa, Sudan, Zimbabwe Middle East and North Africa (MNA): Egypt, Iran, Iraq, Israel **Eastern Europe and Central Asia (ECA):** Albania, Bosnia and Herzegovina, Bulgaria, Czech Republic, Georgia, Hungary, Romania, Serbia and Montenegro, Turkey, Ukraine, United Kingdom **Europe:** Austria, Denmark, Germany, Greece, Italy, Spain, Sweden **South Asia (SAS):** Afghanistan, India **East Asia and Pacific (EAP):** Cambodia, Hong Kong (P.R. China) Indonesia, Japan, Korea (Rep. of), Myanmar, Thailand, Viet Nam
Foot and mouth disease (FMD)	Bovidae, swine, sheep, goats, buffalo, and all wild ruminants and suidae. Camelidae	In a susceptible population, morbidity approaches 100%. The disease is rarely fatal except in young animals.	**Generally:** • Effective surveillance and early reporting of outbreaks • Border animal movement controls • Quarantine measures	Outbreaks have occurred in the following countries: **Sub- Saharan Africa (AFR):** Benin, Botswana, Burkina, Cameroon, Congo

Disease	Host	Virulence	Prevention and Control	Occurrence of the disease in World (from 01/01/05 to 10/02/07)
	have low susceptibility.		**In the affected area:** • Four strategies are recognised by the OIE in a programme to eradicate FMD infection following an outbreak: 1. slaughter of all clinically affected and in-contact susceptible animals; 2. slaughter of all clinically affected and in-contact susceptible animals and vaccination of at-risk animals, with subsequent slaughter of vaccinated animals; 3. slaughter of all clinically affected and in-contact susceptible animals and vaccination of at-risk animals, without subsequent slaughter of vaccinated animals; 4. vaccination used without slaughter of affected animals or subsequent slaughter of vaccinated animals. • Destruction of cadavers, litter, and susceptible animal products in the infected area • Disinfection of premises and all infected material • Restriction and control of movement of susceptible animals • Zoning • Epidemiological investigation • Efficient surveillance • Quarantine measures	(Dem. Rep. of the), Cote D'Ivoire, Eritrea, Ethiopia, Faso, Ghana, Guinea, Kenya, Malawi, Mali, Niger, South Africa, Sudan, Tanzania, Togo, Zimbabwe **Middle East and North Africa (MNA):** Israel, Jordan, Saudi Arabia Eastern Europe and Central Asia (ECA): Turkey **Europe:** South Asia (SAS): Afghanistan, Bhutan, Sri Lanka, Nepal **East Asia and Pacific (EAP):** China (People's Rep. of), Myanmar, Thailand, Viet Nam **Latin America and Caribbean (LAC):** Brazil, Ecuador, Bolivia
Swine vesicular disease	Pigs Humans: laboratory personnel may seroconvert.	Morbidity rate in herds may be low but high in groups of pigs (in pens). No mortality	• No treatment • No vaccination • Control of movement of pigs and vehicles used for transporting pigs • Prohibition of feeding with ship or aircraft garbage • Thorough cooking of garbage • Strict quarantine • Elimination of infected and contact pigs • Thorough disinfection of premises, transport vehicles, and equipment	The disease has been recorded in Hong Kong, Japan and several European countries in the past. During 2005 the disease was clinically demonstrated in Italy

Disease	Host	Virulence	Prevention and Control	Occurrence of the disease in World (from 01/01/05 to 10/02/07)
Vesicular stomatitis	Human (minor zoonosis). Domestic hosts: equidae, bovidae, suidae. Wild hosts: white-tailed deer and numerous species of small mammals in the tropics.	Morbidity rate variable, up to 90% in a herd. Low mortality rate	• No treatment • No vaccine • Restriction and control of animal movement from the affected premises • Disinfection of trucks and fomites • Surveillance	The disease is limited to the Americas.
Peste de petits Ruminants	Goats and sheep Cattle and pigs develop inapparent infections.	Morbidity (90%) and mortality (50-80%) rates are higher in young animals than in adults.	• No specific treatment • Movement control and quarantine • Rinderpest vaccine is commonly used. Recently, a homologous PPR vaccine has been developed • Slaughter of infected animals • Destruction of carcasses • Disinfection	PPR occurs in Africa, the Arabian Peninsula, the Middle East and Turkey
Contagious Bovine Pleuropneumonia (CBPP)	Cattle, zebu and buffalo. Wild bovids and camels are resistant.	Mortality rates can reach 50% in early stages. During an outbreak only 33% of animals present symptoms (hyperacute or acute forms), 46% are infected but have no symptoms (sub-clinical forms) and 21% seem to be resistant.	• No efficient treatment **In disease-free areas**: • Quarantine, • Surveillance (blood testing) • Slaughtering of all animals of the herd in which positive animals have been found • Control of cattle movements **In infected areas:** • Vaccination	CBPP is widespread in Africa. The disease was suspected (not confirmed) in 2005 in Mongolia
Lumpy skin disease	Cattle Oryx, giraffe and impala are susceptible to experimental infection. LSD virus replies in	Morbidity rate 5-85% Mortality rate very variable (usually low).	• No specific treatment • Vaccination **Free countries**: • Survey of importation of livestock, carcases, hides, skins and semen **Infected countries:** • Quarantine to avoid introduction of infected animals in to	The disease is present in Africa and reoccurs in Israel. It has also been recorded in Vietnam

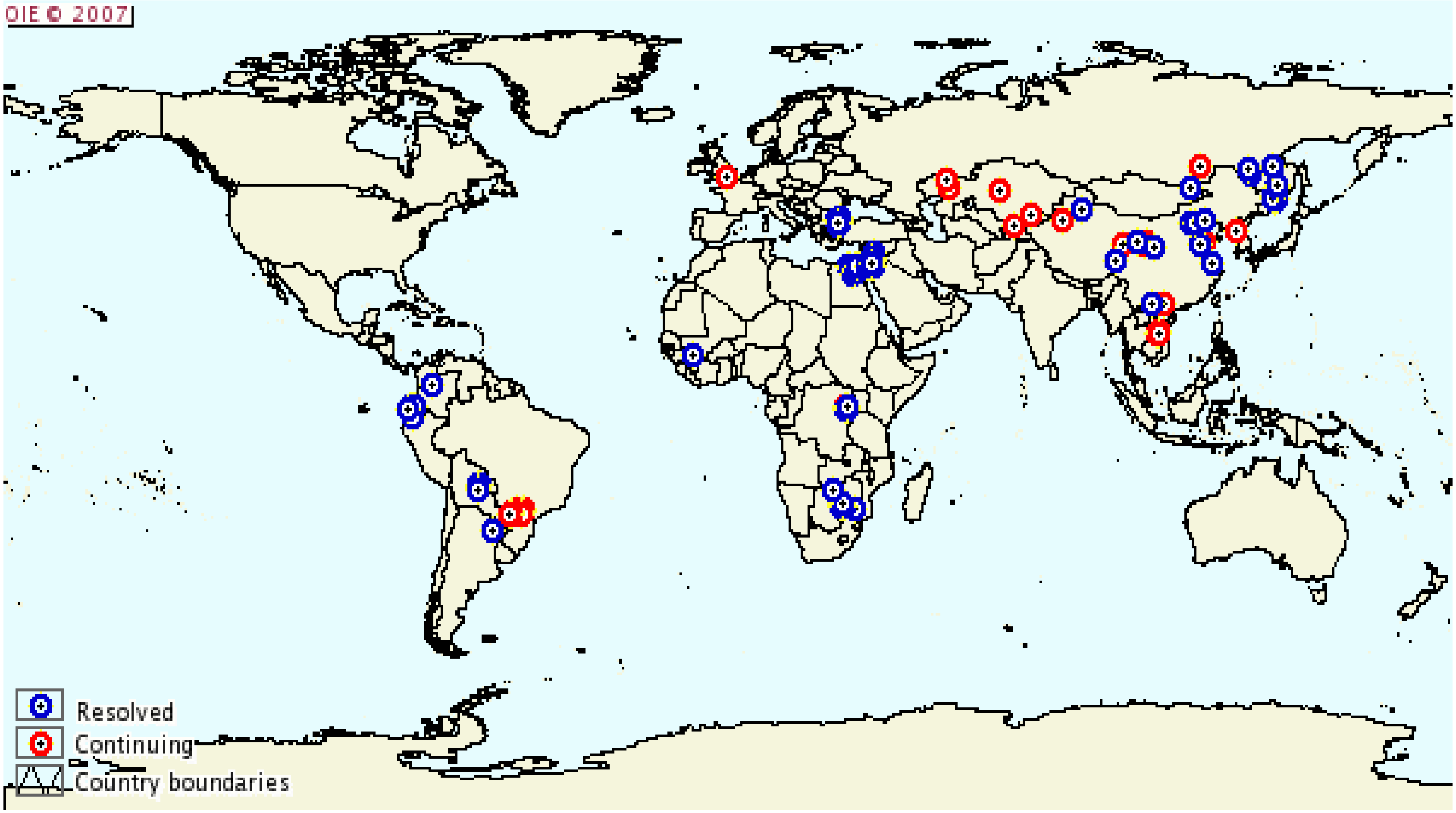
Disease	Host	Virulence	Prevention and Control	Occurrence of the disease in World (from 01/01/05 to 10/02/07)
	Sheep and goats after inoculation		safe herds • In case of outbreaks, isolation and prohibition of animal movements • Slaughtering of all sick and infected animals • Destruction of carcasses • Disinfection of premises and implements • Vector control in premises and on animals • Vaccination	
Rift Valley Fever	Cattle, sheep, goats, dromedaries, several rodents wild ruminants, humans, African monkeys and domestic carnivores	High mortality rate in young animals High abortion rate in ruminants	• No specific treatment • Hygiene and vector control • Vaccination	RVF is present and recurrent in African countries
Bluetongue	Sheep Cattle, goats, dromedaries, wild ruminants: generally inapparent infection	Mortality rate normally low in sheep but up to 10% in some epizooties (OIE)	• No efficient treatment **Disease free areas:** • Quarantine • Serological survey • Vector control **Infected areas:** • Vector control • Prophylactic vaccination	During 2006 the disease has occurred in North Africa, Europe and Middle East (Israel). It has also been reported in Saudi Arabia, Latin America and Caribbean
Sheep and goat pox	Sheep and goat	Morbidity rate: endemic areas 70-90%. mortality rate: Endemic areas 5-10%, although can approach 100% in imported animals.	• No treatment • Vaccination for prevention and control • Quarantine of infected herds and sick animals for at least 45 days after recovery • Slaughtering of infected herd • Proper disposal of cadavers and products • Disinfection • Quarantine before introduction into herds • Animal and vehicle movement controls within infected areas	Sheep pox and goat pox are present in Africa, in the Middle East and Asia. During January 2007 it was also reported in Greece and Mongolia
African horse sickness	Usual hosts: horses, mules, donkeys, zebra. Occasional hosts: elephants, onager,	Mortality rate in horses is 70-95%, in mules it is around 50%, and in donkeys it is around 10%.	• No efficient treatment • Slaughtering of affected horses and destruction of cadavers • Vector control (insecticides, repellents, screens) • Vaccination of non-infected horses with polyvalent	It is endemic in Africa

Disease	Host	Virulence	Prevention and Control	Occurrence of the disease in World (from 01/01/05 to 10/02/07)
	camels, and dogs (after eating infected blood or horsemeat).		vaccine. After virus identification, animals that received polyvalent vaccine should be revaccinated with the homologous vaccine	
African swine fever	All breeds and types of domestic pigs and European wild boars.	Mortality rates vary from 0 to 100%, depending on the virulence of the virus with which pigs are infected.	- No treatment - No vaccine **In free country:** - Careful import policy for animals and animal products - Proper disposal of waste food from aircraft or ships coming from infected countries - Efficient sterilisation of garbage **In outbreaks** - Rapid slaughtering of all pigs and proper disposal of cadavers and litter is essential - Thorough cleaning and disinfection - Designation of infected zone, with control of pig movements - Detailed epidemiological investigation, with tracing of possible sources (up-stream) and possible spread (down-stream) of infection - Surveillance of infected zone, and surrounding area **Infected countries** - Avoid contact between pigs and soft tick vectors (Africa)	It is endemic in many African countries and in Italy is restricted to Sardinia.
Classical swine fever	Pigs and wild boars	Virulence varies from severe, with high mortality, to mild or even subclinical. Fatal to young, cronich for adults.	- No treatment - Strict import policy for live pigs, and fresh and cured pig meat - Quarantine of pigs before admission into herd - Efficient sterilisation (or prohibition) of waste food fed to pigs - Serological surveillance targeted to breeding sows and boars - Prophylactic vaccination where classical swine fever is enzootic **Response to outbreaks** - slaughter of all pigs on affected premises - Proper disposal of carcases	CFS occurs in Latin and Central America, in parts of Europe, Asia and Africa (Madagascar)

Disease	Host	Virulence	Prevention and Control	Occurrence of the disease in World (from 01/01/05 to 10/02/07)
			• Disinfection • Designation of infected zone, with control of pig movements • Detailed epidemiological investigation • Surveillance of infected zone, and surrounding area	
Newcastle Disease	Birds, both domestic and wild A carrier state may exist in some wild birds.	The mortality and morbidity rates vary among species, and with the strain of virus.	• No treatment • Vaccination for permanent immunity • Avoidance of contact with birds of unknown health status • One age group per farm ('all in-all out') breeding is recommended • Strict isolation of outbreaks • Destruction of all infected and exposed birds • Proper disposal of carcasses • Disinfection • 21 days before restocking • Control of human traffic	Newcastle Disease have been reported in Asia, Africa (most sub- Saharan), Middle East and Europe

Annex 2: Occurrence of HPAI/H5N1 and FMD: current status worldwide

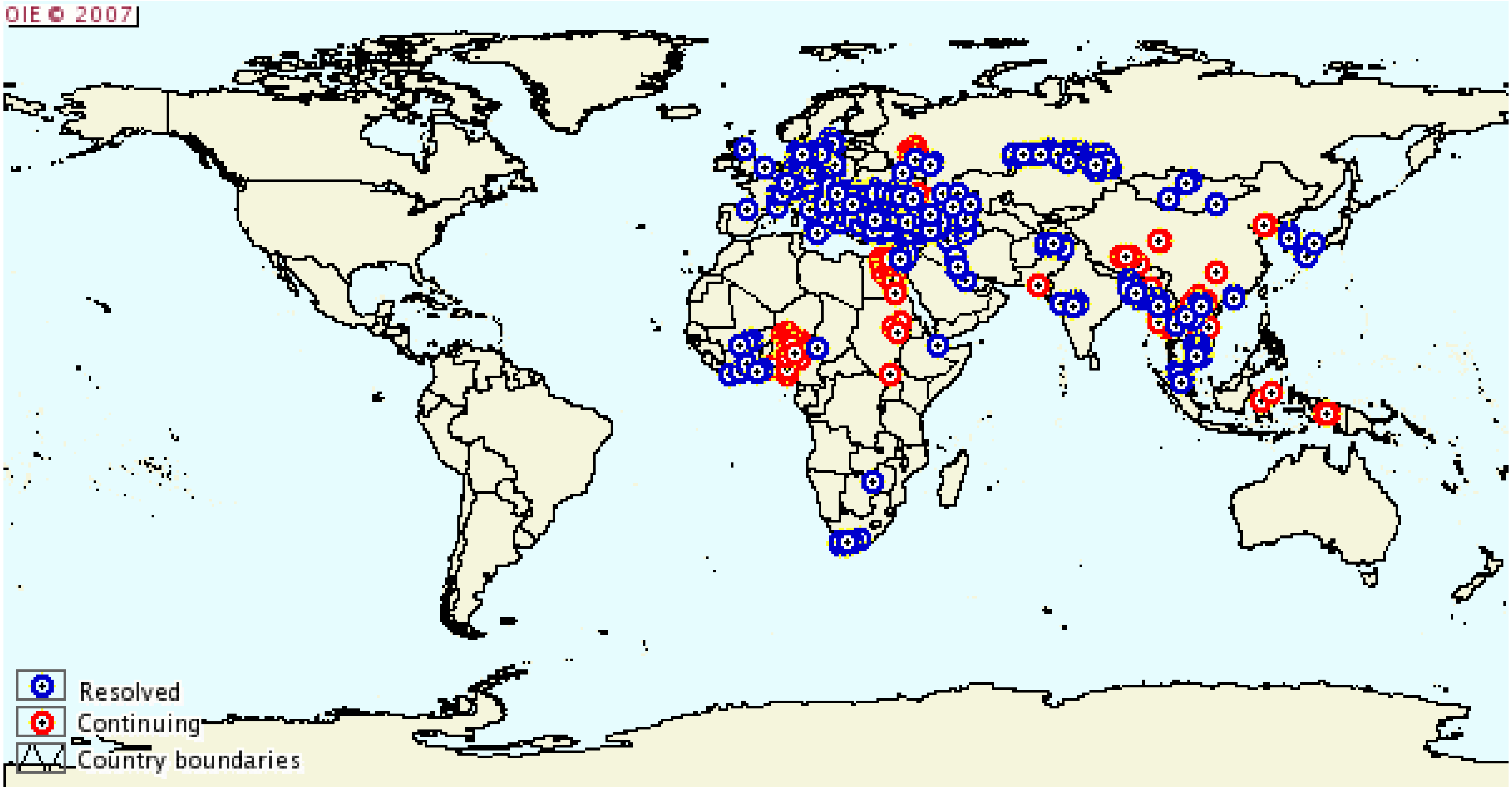
FMD outbreaks



Note: covers period 1 Jan 2006 to end of August 2007. (Reports received in paper form in early 2006, before the launching of WAHID, are being processed in the new World Animal Health Database and may not be shown).

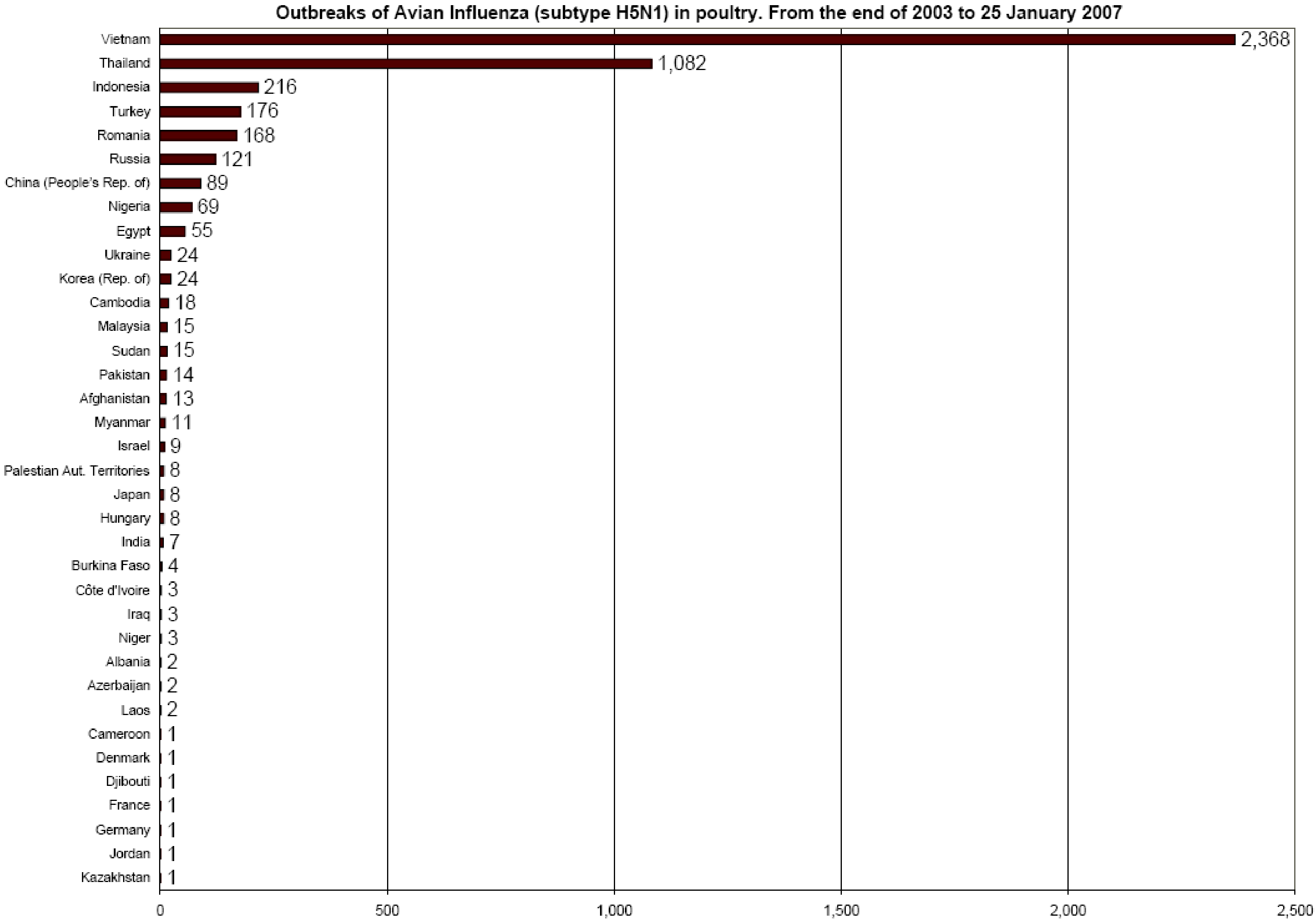
Source: OIE, World Animal Health Information Database (WAHID)

HPAI outbreaks



Note: covers period 1 Jan 2006 to end of August 2007. (Reports received in paper form in early 2006, before the launching of WAHID, are being processed in the new World Animal Health Database and may not be shown).

Source: OIE, World Animal Health Information Database (WAHID)


Outbreaks of Avian Influenza (subtype H5N1) in poultry. From the end of 2003 to 25 January 2007
Vietnam 2,368
Thailand 1,082
Indonesia 216
Turkey 176
Romania 168
Russia 121
China (People's Rep. of) 89
Nigeria 69
Egypt 55
Ukraine 24
Korea (Rep. of) 24
Cambodia 18
Malaysia 15
Sudan 15
Pakistan 14
Afghanistan 13
Myanmar 11
Israel 9
Palestian Aut. Territories 8
Japan 8
Hungary 8
India 7
Burkina Faso 4
Côte d'Ivoire 3
Iraq 3
Niger 3
Albania 2
Azerbaijan 2
Laos 2
Cameroon 1
Denmark 1
Djibouti 1
France 1
Germany 1
Jordan 1
Kazakhstan 1
0
500
1,000
1,500
2,000
2,500

Annex 3: OIE country analysis

	OIE member	Region	Income group	World Bank Income Group	Poverty (HDI index)	Trade interest (livestock sector)	Trade interest (poultry sector)	Agriculture income (as % of GDP)	Total LSU per Capita (All Livestock)	LSUs per capita for Poultry
1	Afghanistan	CIS	*bottom low*	Low income				*0.0%*	*0.20*	*0.002*
2	Albania	rest of Europe	*middle*	Lower middle income	*..*	*Importer*	*Importer*	*24.6%*	*0.14*	*0.010*
3	Algeria	North Africa	*middle*	Lower middle income	*21.5*	*Importer*	*Importer*	*8.7%*	*0.15*	*0.027*
4	Angola	sub-sah Africa; SADC	*bottom low*	Lower middle income	*40.9*			*5.9%*	*0.21*	*0.003*
5	**Argentina**	**South America; Latin America**	**high**	Upper middle income	**4.3**	*Exporter*	*"Imp/Exp"*	*10.5%*	*1.03*	*0.017*
6	Armenia	CIS	*low*	Lower middle income	*..*	*Importer*	*Importer*	*22.6%*	*0.01*	*0.011*
7	Azerbaijan	CIS	*low*	Lower middle income	*..*	*Importer*	*Importer*	*12.1%*	*0.01*	*0.015*
8	Bahrain	Middle East	*upper high*	High income: nonOECD	*..*	*Importer*	*Importer*	*0.5%*	*0.03*	*0.005*
9	Bangladesh	SE Asia	*bottom low*	Low income	*44.2*	*Importer*	*Importer*	*21.9%*	*0.18*	*0.007*
10	Barbados	Latin America	*upper high*	Upper middle income	*4.5*	*Importer*	*Importer*	*6.0%*	*0.15*	*0.088*
11	Belarus	CIS	*middle*	Lower middle income	*..*	*"Imp/Exp"*	*"Imp/Exp"*	*9.0%*	*0.02*	*0.018*
12	Belize	Latin America	*middle*	Upper middle income	*..*	*Importer*	*Importer*	*18.4%*	*0.23*	*0.041*
13	Benin	sub-sah Africa	*bottom low*	Low income	*47.8*	*Importer*	*Importer*	*34.1%*	*0.22*	*0.011*
14	Bhutan	SE Asia	*low*	Low income	*39*				*0.19*	*0.001*
15	Bolivia	South America; Latin America	*bottom low*	Lower middle income	*13.9*	*"Imp/Exp"*	*Importer*	*13.5%*	*0.78*	*0.057*
16	Bosnia-Herz	rest of Europe	*middle*	Lower middle income	*..*	*Importer*	*Importer*	*13.5%*	*0.02*	*0.016*
17	Botswana	sub-sah Africa; SADC	*high*	Upper middle income	*48.3*	*Exporter*	*Importer*	*2.3%*	*1.52*	*0.016*
18	Brazil	South America; Latin America	*middle*	Lower middle income	*10.1*	*Exporter*	*Exporter*	*7.6%*	*0.98*	*0.041*
19	Brunei	SE Asia	*upper high*	High income: nonOECD	*..*	*Importer*	*Importer*	*0.0%*	*0.25*	*0.243*
20	Bulgaria	rest of Europe	*middle*	Lower middle income	*..*	*"Imp/Exp"*	*"Imp/Exp"*	*9.9%*	*0.02*	*0.016*
21	Burkina Faso	sub-sah Africa	*bottom low*	Low income	*58.3*	*Exporter*	*Importer*	*38.9%*	*0.72*	*0.014*
22	Burundi	sub-sah Africa	*bottom low*	Low income	*40.7*	*Importer*	*Importer*	*42.2%*	*0.06*	*0.004*
23	Cambodia	SE Asia	*bottom low*	Low income	*39.3*	*Importer*	*Importer*	*26.0%*	*0.21*	*0.007*
24	Cameroon	sub-sah Africa	*bottom low*	Lower middle income	*35.6*			*41.9%*	*0.36*	*0.013*
25	Central Afr. Rep.	sub-sah Africa	*bottom low*	Low income	*47.8*	*Importer*	*Importer*	*58.5%*	*0.79*	*0.008*
26	Chad	sub-sah Africa	*bottom low*	Low income	*57.9*			*20.0%*	*0.62*	*0.004*
27	Chile	South America; Latin America	*high*	Upper middle income	*3.7*	*"Imp/Exp"*	*Exporter*	*5.2%*	*0.40*	*0.041*
28	China	SE Asia	*low*	Lower middle income	*11.7*	*"Imp/Exp"*	*"Imp/Exp"*	*11.8%*	*0.02*	*0.023*
29	Colombia	South America; Latin America	*middle*	Lower middle income	*7.6*	*"Imp/Exp"*	*Importer*	*10.3%*	*0.55*	*0.023*
30	Comoros	sub-sah Africa	*bottom low*	Low income	*31.6*			*43.4%*	*0.07*	*0.004*
31	Congo	sub-sah Africa; SADC	*bottom low*	Lower middle income	*27.9*			*5.4%*	*0.04*	*0.004*
32	Congo Dem. Rep	sub-sah Africa	*bottom low*	Low income	*40.9*			*58.5%*	*0.02*	*0.002*
33	Costa Rica	Latin America	*high*	Upper middle income	*4.4*	*Exporter*	*"Imp/Exp"*	*8.5%*	*0.34*	*0.032*
34	Cote d'Ivoire	sub-sah Africa	*bottom low*	Low income	*41.5*			*27.4%*	*0.10*	*0.013*
35	Croatia	rest of Europe	*high*	Upper middle income	*..*	*Importer*	*"Imp/Exp"*	*7.5%*	*0.02*	*0.016*
36	Cuba	Latin America	*bottom low*	Lower middle income	*4.7*	*Importer*	*Importer*		*0.32*	*0.017*
37	Djibouti	sub-sah Africa	*bottom low*	Lower middle income	*30*					
38	Dominican Rep	Latin America	*middle*	Lower middle income	*11.9*	*Importer*	*Importer*	*6.5%*	*0.28*	*0.037*
39	Ecuador	South America; Latin America	*low*	Lower middle income	*8.9*	*"Imp/Exp"*	*"Imp/Exp"*	*6.4%*	*0.46*	*0.055*
40	Egypt	North Africa	*low*	Lower middle income	*20*			*13.7%*	*0.08*	*0.009*
41	El Salvador	Latin America	*low*	Lower middle income	*15.7*	*Importer*	*"Imp/Exp"*	*9.5%*	*0.18*	*0.014*
42	Eq. Guinea	sub-sah Africa	*high*	Upper middle income	*38.1*			*2.6%*	*0.02*	*0.004*
43	Eritrea	sub-sah Africa	*bottom low*	Low income	*38.1*	*Importer*	*Importer*	*11.1%*	*0.44*	*0.002*
44	Ethiopia	sub-sah Africa	*bottom low*	Low income	*55.3*	*Exporter*	*"Imp/Exp"*	*32.4%*	*0.47*	*0.004*

45	FYR Macedonia	rest of Europe	*middle*	Lower middle income	*..*			*11.0%*	*0.01*	*0.009*
46	Gabon	sub-sah Africa	*middle*	Upper middle income	*27.3*	*Importer*	*Importer*	*5.0%*	*0.10*	*0.016*
47	Gambia	sub-sah Africa	*bottom low*	Low income	*44.7*	*Importer*	*Importer*	*34.1%*	*0.21*	*0.003*
48	Georgia	CIS	*low*	Lower middle income	*..*	*Importer*	*Importer*	*12.8%*	*0.01*	*0.014*
49	Ghana	sub-sah Africa	*bottom low*	Low income	*33.1*	*Importer*	*Importer*	*31.4%*	*0.10*	*0.009*
50	Guatemala	Latin America	*low*	Lower middle income	*22.9*	*Importer*	*Importer*	*23.6%*	*0.19*	*0.015*
51	Guinea	sub-sah Africa	*low*	Low income	*52*	*Importer*	*Importer*	*27.2%*	*0.34*	*0.012*
52	Guinea Bissau	sub-sah Africa	*bottom low*	Low income	*48.2*			*58.9%*	*0.39*	*0.007*
53	Guyana	South America	*low*	Lower middle income	*..*	*Importer*	*Importer*	*38.4%*	*0.36*	*0.186*
54	Haiti	Latin America	*bottom low*	Low income	*39.4*			*39.0%*	*0.20*	*0.005*
55	Honduras	Latin America	*low*	Lower middle income	*17.2*	*Importer*	*Importer*	*12.3%*	*0.34*	*0.018*
56	India	SE Asia	*bottom low*	Low income	*31.3*	*Exporter*	*Exporter*	*19.6%*	*0.17*	*0.003*
57	Indonesia	SE Asia	*low*	Lower middle income	*18.5*	*Importer*	*"Imp/Exp"*	*13.2%*	*0.09*	*0.039*
58	Iran	Middle East	*middle*	Lower middle income	*16.4*	*Importer*	*"Imp/Exp"*	*11.2%*		
59	Iraq	Middle East	*bottom low*	Lower middle income					*0.09*	*0.008*
60	Jamaica	Latin America	*middle*	Lower middle income	*14.8*	*Importer*	*Importer*	*4.4%*	*0.18*	*0.033*
61	Jordan	Middle East	*middle*	Lower middle income	*7.6*	*Importer*	*Importer*	*3.3%*	*0.08*	*0.031*
62	Kazakhstan	CIS	*middle*	Lower middle income	*..*	*Importer*	*Importer*	*6.1%*	*0.01*	*0.012*
63	Kenya	sub-sah Africa	*bottom low*	Low income	*35.5*	*Exporter*	*Exporter*	*14.5%*	*0.46*	*0.006*
64	Korea North	other Asia	*bottom low*	Low income					*0.07*	*0.007*
65	Korea South	other Asia	*upper high*	High income: OECD	*..*	*Importer*	*Importer*	*0.0%*	*0.02*	*0.016*
66	Kuwait	Middle East	*upper high*	High income: nonOECD	*..*	*Importer*	*Importer*	*0.4%*	*0.13*	*0.085*
67	Kyrgyzstan	CIS	*low*	Low income	*..*	*Importer*	*Importer*	*32.9%*	*0.01*	*0.005*
68	Laos	SE Asia	*bottom low*	Low income	*36*			*43.9%*	*0.26*	*0.023*
69	Lebanon	Middle East	*middle*	Upper middle income	*9.6*	*Importer*	*"Imp/Exp"*	*11.3%*	*0.12*	*0.068*
70	Lesotho	sub-sah Africa; SADC	*bottom low*	Lower middle income	*47.5*			*14.7%*	*0.36*	*0.007*
71	Libya	North Africa	*high*	Upper middle income	*..*			*6.7%*	*0.15*	*0.030*
72	Madagascar	sub-sah Africa; SADC	*bottom low*	Low income	*36.3*	*Importer*	*Exporter*	*26.8%*	*0.53*	*0.009*
73	Malawi	sub-sah Africa; SADC	*bottom low*	Low income	*43*	*Importer*	*Importer*	*33.8%*	*0.08*	*0.008*
74	Malaysia	SE Asia	*high*	Upper middle income	*8.3*	*Importer*	*Importer*	*6.8%*	*0.10*	*0.051*
75	Mali	sub-sah Africa	*bottom low*	Low income	*60.2*	*Importer*	*Importer*	*46.0%*	*0.62*	*0.016*
76	Mauritania	sub-sah Africa	*bottom low*	Low income	*41*			*18.5%*	*0.95*	*0.010*
77	Mauritius	sub-sah Africa; SADC	*high*	Upper middle income	*11.3*	*Importer*	*Importer*	*6.3%*	*0.08*	*0.055*
78	Mexico	Latin America	*high*	Upper middle income	*7.2*	*Importer*	*Importer*	*3.7%*	*0.34*	*0.028*
79	Moldova	CIS	*low*	Lower middle income	*..*		*Importer*	*17.9%*	*0.13*	*0.029*
80	Mongolia	other Asia	*bottom low*	Low income	*18.5*	*Exporter*	*Importer*	*15.6%*	*1.69*	*0.000*
81	Morocco	North Africa	*low*	Lower middle income	*33.4*	*Importer*	*Importer*	*22.2%*	*0.20*	*0.030*
82	Mozambique	sub-sah Africa; SADC	*bottom low*	Low income	*48.9*	*Importer*	*Importer*	*22.1%*	*0.08*	*0.010*
83	Myanmar	SE Asia	*bottom low*	Low income	*21.6*	*Importer*	*Importer*		*0.23*	*0.011*
84	Namibia	sub-sah Africa; SADC	*middle*	Lower middle income	*32.5*	*"Imp/Exp"*	*Importer*	*7.7%*	*1.44*	*0.012*
85	Nepal	SE Asia	*bottom low*	Low income	*38.1*	*Importer*	*Importer*	*36.1%*	*0.25*	*0.006*
86	New Caledonia	SE Asia	*high*	High income: nonOECD		*Importer*	*Importer*		*0.40*	*0.018*
87	Nicaragua	Latin America	*low*	Lower middle income	*18*	*Exporter*	*"Imp/Exp"*	*17.2%*	*0.62*	*0.023*
88	Niger	sub-sah Africa	*bottom low*	Low income	*56.4*	*Importer*	*Importer*	*39.8%*	*0.24*	*0.013*
89	**Nigeria**	**sub-sah Africa**	***bottom low***	Low income	***40.6***	*Importer*	*Importer*	*21.1%*	*0.15*	*0.008*
90	Oman	Middle East	*upper high*	Upper middle income	*..*	*Importer*	*Importer*	*2.4%*	*0.17*	*0.011*
91	Pakistan	SE Asia	*bottom low*	Low income	*36.3*	*Exporter*	*Importer*	*17.9%*	*0.21*	*0.007*

92	Panama	South America; Latin America	middle	Upper middle income	7.9	"Imp/Exp"	Importer	7.6%	0.44	0.030
93	Paraguay	South America; Latin America	low	Lower middle income	8.3	Exporter	"Imp/Exp"	27.9%	1.21	0.019
94	Peru	South America; Latin America	middle	Lower middle income	11.6	Importer	Importer	7.4%	0.26	0.025
95	Philippines	SE Asia	low	Lower middle income	15.3	Importer	Importer	13.6%	0.08	0.011
96	Qatar	Middle East	upper high	High income: nonOECD	7.9	Importer	Importer	0.2%	0.05	0.039
97	**Romania**	**rest of Europe**	**middle**	Upper middle income	**..**	Importer	Importer	9.8%	0.03	0.028
98	Russia	CIS	high	Upper middle income	..	Importer	Importer	4.9%	0.02	0.016
99	Rwanda	sub-sah Africa	bottom low	Low income	37.3	Importer	Importer	33.3%	0.13	0.002
100	Sao Tome	sub-sah Africa	bottom low	Low income	..				0.02	0.016
101	Saudi Arabia	Middle East	upper high	High income: nonOECD	..	Importer	Importer	3.0%	0.04	0.040
102	Senegal	sub-sah Africa	bottom low	Low income	44	Importer	Importer	15.5%	0.30	0.016
103	Serbia-Mont	rest of Europe	middle	Lower middle income		Importer	Importer	18.0%	0.01	0.011
104	Sierra Leone	sub-sah Africa	bottom low	Low income	51.9			45.8%	0.08	0.010
105	Singapore	SE Asia	upper high	High income: nonOECD	6.3	Importer	Importer	0.0%	0.00	0.003
106	Somalia	sub-sah Africa	bottom low	Low income					0.90	0.003
107	South Africa	sub-sah Africa; SADC	high	Upper middle income	30.9	Importer	Importer	2.7%	0.31	0.018
108	Sri Lanka	SE Asia	low	Lower middle income	17.7	Importer	Importer	16.5%	0.06	0.004
109	Sudan	sub-sah Africa	bottom low	Low income	31.3	Exporter	Importer	32.3%	1.16	0.007
110	Suriname	South America	middle	Lower middle income	10.3	Importer	Importer	13.4%	0.30	0.059
111	Swaziland	sub-sah Africa; SADC	middle	Lower middle income	52.5	"Imp/Exp"	Importer	12.4%	0.56	0.022
112	Syria	Middle East	middle	Lower middle income	14.4	Exporter	Exporter	23.5%	0.15	0.009
113	Taipei China (Taiwan)	SE Asia	upper high					2.0%		
114	Tajikistan	CIS	bottom low	Low income	..	Importer	Importer	20.6%	0.00	0.002
115	Tanzania	sub-sah Africa; SADC	bottom low	Low income	36.3			40.5%	0.49	0.005
116	Thailand	SE Asia	middle	Lower middle income	9.3	Exporter	Exporter	9.7%	0.12	0.028
117	Togo	sub-sah Africa	bottom low	Low income	39.2	Importer	Importer	38.9%	0.12	0.010
118	Trinidad-Tobago	Latin America	upper high	Upper middle income	8.8	Importer	Importer	0.6%	0.19	0.151
119	Tunisia	North Africa	middle	Lower middle income	17.9	Importer	"Imp/Exp"	15.3%	0.23	0.044
120	Turkey	rest of Europe	middle	Upper middle income	9.8	Exporter	Exporter	11.1%	0.23	0.028
121	Turkmenistan	CIS	middle	Lower middle income	..	Importer	Importer	22.0%	0.62	0.010
122	Uganda	sub-sah Africa	bottom low	Low income	36	"Imp/Exp"	Importer	30.2%	0.26	0.008
123	Ukraine	CIS	low	Lower middle income	..	"Imp/Exp"	Importer	15.1%	0.02	0.020
124	UAE	Middle East	upper high	High income: nonOECD	15.9	Importer	Importer	3.2%	0.05	0.023
125	Uruguay	South America; Latin America	high	Upper middle income	3.3	Exporter	Exporter	7.2%	2.98	0.028
126	Uzbekistan	CIS	bottom low	Low income	..			33.4%	0.01	0.005
127	Vanuatu	SE Asia	low	Lower middle income	24.7				0.66	0.011
128	Venezuela	South America; Latin America	middle	Upper middle income	8.8	Importer	Importer	4.1%	0.53	0.029
129	**Vietnam**	**SE Asia**	**bottom low**	Low income	**15.7**			18.6%	0.14	0.013
130	Yemen	Middle East	bottom low	Low income	40.6	Importer	Importer	12.3%	0.14	0.012
131	Zambia	sub-sah Africa; SADC	bottom low	Low income	45.6	Exporter	Exporter	17.0%	0.21	0.018
132	Zimbabwe	sub-sah Africa; SADC	bottom low	Low income	46	Exporter	Exporter	23.2%	0.40	0.012

Notes

Region*: some countries have been assumed to belong to a certain grouping to facilitate aggregation (e.g. Vanuatu and New Caledonia to SE Asia*

Income group*: defined on basis of per capita income, as follows:*

upper high: >10000 US$ both in nominal and in relative (ppp) terms

high: 8-10000 US$ in nominal or 4.5-10000 US$ in nominal and >10000 US$ in relative (ppp) terms

middle: 3-8000 US$ nominal or 2-4500 US$ nominal and 5-10000 US$ in relative (ppp) terms

low: 1-3000 US$ in nominal and 3-5000 US$ in relative (ppp) terms

bottom low: <1000 US$ in nominal and <3000 US$ in relative (ppp) terms

Trade interest*: defined on the basis of a livestock trade specialisation index (methodology described in A129*

Annex 4: Prevention and response to AI: national emergency plans and WB-GPAI/APL projects

Note: This list contains only the WB-GPAI/APL projects that had been approved at the time of this analysis, i.e. by end of March 2007.

	Country	Title	Date	Programme duration	Plan/Project	Budget info	Total budget	Size of poultry sector (2005)
	Sub-Saharan Africa							
2	***Benin***	PLAN D'INTERVENTION D'URGENCE CONTRE LA GRIPPE AVIAIRE (A 297)	Feb-06	6 months	National Contingency Plan for Avian Influenza	Emergency plan **Intervention in Animal Health:** FCFA 2,658 million (US$ 5.33 million) • Preparation: FCFA 587.6 million (US$ 1.178 million) • Investigation: FCFA 0.790 million (US$ 0.002 million) • Alert: FCFA 4 million (US$ 0.008 million) • Operations: FCFA 2,059.345 million (US$ 4.128 million) • End of restriction: FCFA 6 million (US$ 0.012 million) **Intervention in Human Health:** FCFA 468 million (US$ 0.938 million)	**FCFA 3,126 million (US$6.226 million) without contingency**	**Poultry population: 13 million**
3	***Burkina Faso***	PLAN STRATÉGIQUE POUR LA PRÉPARATION ET LA RIPOSTE À D'ÉVENTUELS CAS DE GRIPPE AVIAIRE AU BURKINA FASO EN 2005-2006 (draft) (A298)	Oct-05	2005-2006	National Contingency Plan for Human Pandemic Inluenza (DRAFT)	**Epidemiological surveillance :** FCFA 52.5 million (US$ 0.097 million) **Laboratory:** FCFA 38.5 million (US$ 0.071 million) **Early and adeguate case treatment:** FCFA 76 million (US$ 0.140 million) **Social Mobilization:** FCFA 33.5 million (US$ 0.062 million) **Disinfection and biosecurity:** FCFA 45 million (US$ 0.083 million) **Research:** FCFA 37 million (US$ 0.068 million) **Epidemic management:** FCFA 34 (US$ 0.063 million)	**FCFA 316.5 million (US$ 0.584 million)**	**Poultry population: 25.7 million**
4	***Cameroon***	PLAN STRATEGIQUE DE LUTTE CONTRE L'EPIDEMIE DE GRIPPE HUMAINE DE SOUCHE AVIAIRE AU CAMEROUN (A299)	Jan-06	2006	National Contingency Plan for Human Pandemic Inluenza	• **Strengthening of surveillance systems in Human and Animal sector:** FCFA 190 million (0. 349 million US$) • **Prevention of Human infection:** FCFA 1,720 million (3.162 million US$) • **Information, Education and Communication:** FCFA 250 million (0.460 million US$) • **AI Human cases management:** FCFA 2,720 million (5 million US$) • **Epidemiological and Therapeutical Research:** FCFA 150 million (0.276 million US$)	**FCFA 5,030 million (9.247 million US$)**	**Poultry populationt: 31 million**
5	***Cap Vert***	PLAN NATIONAL DE LUTTE CONTRE LA GRIPPE AVIAIRE H5N1(A300)	Feb-06	2006-2008	National Contingency Plan for Avian Influenza	**Budget details not available**	**Escudos Capverdien 9,039,137 (US$1.067million)**	**Poultry population: 0.46 million**
6	***Central African Republic***	PLAN DE PREPARATION ET DE RIPOSTE A LA GRIPPE AVIAIRE (A301)	Mar-06	Not specified	National Contingency Plan for Avian Influenza	· **Level 1:** No infection in-country but in the region or in economic partner countrie (including training, surveys, surveillance, communication for Human and Animal sector): FCFA 1,179 million (US$ 2.184 million) · **Level 2:** Avian flu declaration in neighboring countries (including training, import restrictions, border control for Animal sector): FCFA 85.680 million (US$ 0.159 million) · **Level 3:** Avian flu declaration in poultry (including culling, quarantine, vaccination, training for Human and Animal sector): FCFA 515 million (US$ 0.954 million) · **Level 4:** Human case suspicion (medicine stockpiling, human case managment fro Human sector): FCFA 489 million (US$ 0.906 million) · **Level 5:** Flu pandemic, human-human infection(vaccination, case treatment for Human sector): FCFA 2,840 million (US$ 5.259 million) · **Follow up/evaluation:** FCFA 24 million (US$ 0.044 million)	**FCFA 5,133.180 million (US$ 9.506 million)**	**Poultry population: 4.8 million**
7	***Gambia***	EMERGENCY PREPAREDNESS AND RESPONSE PLAN FOR AVIAN INFLUENZA (A303)	Feb-06	Not specified	National Contigency Plan for Avian Influenza	**Strengthening Surveillancein Animal and Human sector:** GDM 41.621 million (US$ 1.497 million) **Prevention and control in Animal and Human sector:** GDM 20.605 million (US$ 0. 723 million) **Communication:** GDM 1.522 million (US$ 0,055 million)	**GDM 63.748 million (US$ 2.275 million)**	**Poultry population: 0.65 million**
8	***Ghana***	PREPAREDNESS AND RESPONSE PLAN FOR AVIAN AND HUMAN PANDEMIC INFLUENZA 2005-2006 (REVISED ON FEBRUARY 2006) (A304)	Feb-06	2006	National Contingency Plan for Avian Influenza	**Planning and Coordination:** US$ 0.293 million **Surveillance, Situation Monitoring and Assessment in Human and Animal sector:** US$ 2.036 million • Surveillance of migratory bird Populations: US$ 234,957 • Surveillance of Domestic animal Populations: US$ 307,100 • Surveillance of Human Populations:US$ 1,949,370 **Prevention and Containment:** US$ 2.822 million • in Domestic Animal Populations: US$ 1,218,878 • in Human Populations: US$ 1,602,708 **Health System Response:** US$ 0.710 million **Communications:** US$ 0.421 million	**US$ 6.281 million**	**Poultry population: 30 million**

9	***Guinea***	PLAN NATIONAL MULTI-SECTORIEL DE PREPARATION ET DE RIPOSTE A LA GRIPPE AVIAIRE (A305)	Feb-06	2006	National Contingency Plan for Avian Influenza	· **Epidemiological surveillance reinforcement in Human and Animal sector :** FG (Francs Guinéens) 677.250 million (US$ 0,152 million) · **Reinforcement of laboratory capacity in Human and Animal sector:** FG 490 million (US$ 0,11 million) · **AI case treatment and management in Human and Animal sector:** FG 1,398.8 million (US$ 0.314 million) · **Management/coordination:** FG 152.750 million (US$ 0.034 million) · **Social mobilization:** FG 64.710 million (US$ 0.014 million) · **Research in Human and Animal sector:** FG 75 million (US$ 0.016 million)	**FG 2,859 million (US$0.766 million)**	**Poultry population: 15.87 million**
10	***Guiné-Bissau***	PLANO ESTRATÉGICO NACIONAL DE PREVENÇÃO E DE LUTA CONTRA A GRIPE DAS AVES (A306)	Mar-06	2006-2007	National Contingency Plan for Avian Influenza	**Surveillance and Epidemiological Surveys in Animal sector:** FCFA 380 million (US$ 0.691 million US$) **Training and communication:** FCFA 36.376 million (US$ 0.066 million US$) **Emergency programme in Human and Animal sector:** FCFA 328.5 million (US$ 0.597 million US$)	**FCFA 744.876.000 (US$ 1.354 million)**	**Poultry population: 1.6 million**
12	***Kenya***	AVIAN INFLUENZA EMERGENCY PREPAREDNESS AND RESPONSE (A264)	Nov-05	Not specified	National Contingency Plan for Avian Influenza	**Epidemiological surveillance in Human and Animal sector:** US$ 3,7 million **Infection Prevention and Contro in Human and Animal sectorl:** US$ 3.5 million **IEC and Social Mobilization in Human and Animal sector:** US$ 1.5 million **Case Managemen in Human and Animal sectort:** US$ 4.6 million **Laboratory and Research in Human and Animal sector:** US$ 1.1 million **Co-ordination and Resource Mobilization in Human and Animal sector:** US$ 2.1 million **Training in Human and Animal sector:** US$ 1.2 million **Additional H.Workers:** US$ 2.3 million	**US$ 20.00 million**	**Poultry population: 28.66 million**
13	***Lesotho***	NATIONAL PREPAREDNESS AND RESPONSE PLAN FOR AVIAN INFLUENZA PANDEMIC (A315)	Nov-05	Not specified	National Contingency Plan for Human Pandemic Inluenza	**Phase 1 Inter-pandemic** (to reduce opportunity for human infection): M 1,860,103 (US$ 0.26 million) **Phase 2 Pandemic alert** (to contain or delay the spread of the disease at the source): M 14,121,254 (US$ 1.974 million) **Phase 3 Pandemic** (to reduce morbidity, mortality and social disruption): M 45,000 (US$ 0.06 million)	**M 17,841,460 (US$2.491 million)**	**Poulry population: 1.8 million**
14	***Malawi***	AVIAN INFLUENZA EMERGENCY PREPAREDNESS PLAN FOR MALAWI (A313)	Dec-05	Dec 2005-Jun 2006	National Contingency Plan for Avian Influenza	National preparedeness and response plan to prevent and control the pandemic influenza. The plan includes the following draft of the budget: • **Animal Helath:** MK 85,364,605 (US$ 682,916.8) • **National Parks and Wild life:** MK 200,104,250 (US$1,330,964) • **Human Health:** MK 12,358,852,391 (US$95,068,095)	**MK 12,644,321,246 (US$ 97.082 million)**	**Poultry population: 15.2 million**
14	***Malawi***	AVIAN INFLUENZA IMPLEMENTATION PLAN FOR 2006 (A314)	2006	2006	Implementation Plan	• **Public Awareness:** MK 18,280,155 (US$ 0. 131 million) • **Strengthening of surveillance:** MK 108,945,925 (US$ 0.781 million) • **Migratory birds movement pattern established and mapped:** MK 8,409,300 MK (US$ 0.06 million) • **Capacity for managing the disease strengthened:** MK 59,721,150 (US$ 0.428 million) • **Monitoring and Evaluation strengthened:** MK 8,407,900 (US$ 0.06 million)	**MK 203,755,430 (US$1.461 million)**	**Poultry population: 15.2 million**
18	***Mauritania***	PLAN STRATEGIQUE NATIONAL DE PREVENTION ET DE LUTTE CONTRE LA GRIPPE AVIAIRE 2006-2007 (A308)	Feb-06	2006-2007	National Contingency Plan for Avian Influenza	**Coordination of intervention:** UM 459.64 million (US$ 1.721 million) **Epidemiological Surveillance:** UM 942.6 million (US$ 3.531 million) **Strengthen of laboratory:** UM 525.4 million (US$ 1.967 million) **Information, Education, Communication, Social mobilisation:** UM 192.3 million (US$ 0.720 million) **Medicament (antiviral):** UM 100 million (US$ 0.374 million) **Equipping of structure of isolation:** UM 100 million (US$ 0.374 million) **Compensation:** UM 120 million (US$ 0.449 million)	**UM 2 439 940 000 (US$9.1 million)**	**Poultry population: 4.2 million**
19	***Namibia***	CONTINGENCY PLAN FOR CONTOL AND ERADICATION OF AVIAN INFLUENZA (A317A)	Not reported	Not specified	National Contingency Plan for Avian Influenza	Guidelines for the prevention, control and eventual eradication of Highly Pathogenic Avian Influenza (HPAI) in case of an outbreak of the disease in Namibia.	**No budget estimation**	**Poultry population: 3.5 million**
19	***Namibia***	CONTINGENCY PLAN FOR AVIAN INFLUENZA TO COMPLIMENT THE CONTINGENCY PLAN OF MINISTRY OF AGRICULTURE, WATER AND FORESTRY (A317)	Not reported	Not specified	National Contingency Plan for Human Pandemic Inluenza	Guidelines for the prevention, control and eventual eradication of Highly Pathogenic Avian Influenza (HPAI) in case of an outbreak in Namibia in Human Beings.	**No budget estimation**	**Poultry population: 3.5 million**

20	***Niger***	PLAN NATIONAL D'URGENCE DE PRÉVENTION ET LUTTE CONTRE LA GRIPPE AVIAIRE (A327)	Apr-06	Feb 2006-Feb 2007	National Contingency Plan for Avian Influenza	· **All-level emergency units:** FCFA 498 409 000 (US$ 0,983 million) · **Restrictions of poultry and wild bird product importation:** FCFA 6 145 000 (US$ 0.012 million) · **Elaboration of a communication plan:** FCFA 218 000 000 (US$ 0.430 million) · **Active surveillance:** FCFA 4 764 064 506 (US$ 9.398 million) · **Trade ban and poultry (+derived product) seizing :** FCFA 5 099 800 000 (US$ 10.058 million) · **Slaughter, incineration of contaminated poultry + birds:** FCFA 36 480 000 (US$ 0.072 million) · **Surveillance of population and animal movements in affected areas:** FCFA 77 000 000 (US$ 0.152 million) · **Total ban on hunting:** FCFA 89 288 700 (US$ 0.176 million) · **Surveillance and intervention staff protection:** FCFA 108 000 000 (US$ 0.213 million) · **Medication, vaccination stock:** FCFA 1 543 750 000 (US$ 3.045 million) · **Quarantine and disinfection of infected bird sites:** FCFA 65 000 000 (US$ 0.128 million) · **Quarantine and disinfection of suspect farms:** FCFA 3 600 000 (US$ 0.007 million) · **Quarantine and care of suspected or confirmed infected humans:** FCFA 190 000 000 (US$ 0.375 million) · **Simulation exercise with all actors:** FCFA 20 000 000 (US$ 0.039 million) · **Research/action:** FCFA 50 000 000 (US$ 0.099 million) · **Follow up/evaluation:** FCFA 50 000 000 (US$ 0.099 million)	**FCFA12,819,537,206 (US$ 25.15 million)**	**Poultry population: 25 million**
21	***Nigeria***	STRATEGIES FOR PREVENTION OF INTRODUCTION, DISEASE SURVEILLANCE NETWORKING AND CONTINGENCY PLAN FOR A DISEASE EMERGENCY (A286)	Dec-05	2006-2007	National Strategies for prevention of Avian Influenza	• **International and regional initiatives, travels and technical exchange programmes**: NN (Nigerian Naira) 10.0 million (US$ 0.078 million) • **Establishment and meetings of inter- ministerial committee and intersectoral linkages**: NN 1.5 million (US$ 0.12 million) • **Establishment and meetings of Livestock sector expert committee on HPAI, and Coordination meetings with stakeholders**: NN 5.0 million (US$ 0.039 million) • **Development of technical guidelines**: NN 7.0 million (US$ 0.055 million) • **Training for AH staff, Poultry farmers and public awareness programmes on HPAI**: NN20.0 million (US$ 0.156 million) • **Targeted disease, virus and sero-surveillance livestock/poultry**: NN 80 million (US$ 0.624 million) • **Strengthening of designated diagnostic laboratories**: NN 400.0 million (US$ 3.121 million) • **Research on HPAI virus and disease including vaccine development:** NN 100.0 million (US$ 0.780 million) • **Strengthening of Veterinary quarantine infrastructure including manpower**: NN 100.0 million (US$ 0.780 million) • **Vaccine procurement (20,000 doses/annum)**: US$ 400,000.0 • **Simulation exercises and drills**: NN 2.0 million (US$ 0.016 million) • **Stamping out of affected poultry population with compensation**: NN200.0 million (US$ 1.561 million)	**NN 955,5 million plus US$ 400,000 (US$7.065million)**	**Poultry population: 150.7 million**
21	***Nigeria***	AVIAN INFLUENZA CONTROL AND HUMAN PANDEMIC PREPAREDNESS AND RESPONSE PROJECT (A203)	Mar-06	2006-2008	WB-APL/GPAI	**Component 1 Animal Health (H5N1 containment, control, prevention, and eradication activities in the livestock sector):** US$ 29.20 million **Component2 Human Health (HPAI prevention, preparedness and planning, response and containment activities in the human health sector):** US$ 18.25 million **Component3 Social Mobilization and Strategic Communication (promotion of community education, public awareness,):** US$ 4.08 million **Component 4 Implementation Support and Monitoring & Evaluation (support, monitoring and evaluation):** US$ 6.89 million	**US$ 58.42 million (without contingencies)**	**Poultry population: 150.7 million**
22	***Senegal***	PLAN NATIONAL DE PRÉVENTION ET DE LUTTE CONTRE LA GRIPPE AVIAIRE (A309)	Oct-05	2 years	National Contingency Plan for Avian Influenza	• **Epidemiological surveillance:** FCFA 501.5 million (US$ 921,875) • **Communication Programme:** FCFA 240.5 million (US$ 442,096) • **Emergency intervention plan:** FCFA 655 million (US$ 1,204,045) • **Training Programme:** FCFA 105.506 million (US$ 193,945) • **Coordination Unit:** FCFA 240 million (US$ 441,177)	**FCFA 1,742.506 million (US$ 3.203 million)**	**Poultry population: 26.96 million**
23	***Sierra Leone***	PLAN OF ACTION FOR THE PREVENTION AND CONTROL OF AVIAN INFLUENZA ("BIRD FLU") (draft) (A310)	Nov-05	Not specified	Action Plan (DRAFT)	· **National response (technical committee setup, equipment secretariat):** Le (Leone) 46,750,000 (US$ 0.016 million) · **Public awareness, prevention and control:** Le 205,290,000 (US$ 0.068 million) · **Epidemiological surveillance**: Le 328,750,000 (US$ 0.110 million) · **Entry and spread prevention:** Le 678,000,000 (US$ 0.226 million) · **Human case management:** Le 305,000,000 (US$ 0.102 million)	**Le 1,563.790 million (US$0.522 million)**	**Poultry population: 7.5 million**
24	***Tchad***	PLAN D'ACTION D'URGENCE POUR LA PRÉVENTION ET LA LUTTE CONTRE LA GRIPPE AVIAIRE (A311)	Feb-06	Not specified	Action Plan	**Animal Health:** CFA 796.26 million (US$ 1.595 million) **Human Health:** CFA 110.962 million (US$ 0.222 million) **Environment:** CFA 70.5 million (US$ 0.141 million)	**CFA 975.722 million (US$ 1.955 million)**	**Poultry population: 24 million**

25	***Togo***	PLAN STRATEGIQUE NATIONAL DE PREVENTION ET DE LUTTE CONTRE LA GRIPPE AVIAIRE (A312)	Feb-06	2006-2007	National Contingency Plan for Avian Influenza	· **Community sensitization on AI and behavior:** FCFA 118,235 million (US$ 0.233 million) · **training and diagnostic capacity :** FCFA 160,35 million (US$ 0.316 million) · **Surveillance and early warning system:** FCFA 247,705 million (US$ 0.489 million) · **Bio-security, disinfection, compensation, medicines and vaccines :** FCFA 1,299.5 million (US$ 2.564 million) · **Control measures and human case management:** FCFA 308 million (US$ 0.608 million) · **Follow up and coordination:** FCFA 134 million (US$ 0.264 million)	**FCFA 2 267 790 000 (US$ 4.475 million)**	**Poultry population: 10 million**
26	***Zambia***	AVIAN INFLUENZA AND PANDEMIC INFLUENZA PREPAREDNESS: NATIONAL RESPONSE PLAN (DRAFT) (A316)	Nov-05	Not specified	National Contingency Plan for Avian Influenza (DRAFT)	**Pre-pandemic Phase 3.978 million ZMK (US$ 0.934 million)** • Reduce the opportunity for Human Infection, including multi-sectoral collaboration: ZMK 45 million • Strengthen risk communication to Communities-awareness campaigns: ZMK 311.7 million • Capacity building: ZMK 186 million • Data collection and mapping of migratory birds: ZMK 275 million • Census and mapping of domestic birds: ZMK 1,245.01 million • Strengthen the early warning system-active surveillance of humans and birds: ZMK 1,076.75 • Control of poultry and birds movement: ZMK 688.5 million • Identify and equip place for managing patients: ZMK 150 million **Emergence of Pandemic Virus: ZMK 1,289.92 million (US$ 0.303 million)** • Targeting the virus at the source, bio security equipment and medicines: ZMK 1,289.920 **Pandemic declared and spreading internationally: ZMK 1,415 million (US$ 0.332 million)** • Reduce morbidity, mortality and social disruption: ZMK 1,340 million • Research: ZMK 75 million	**ZMK 6,682.88 million (US$ 1.569 million)**	**Poultry population: 30 million**

TOTAL: 26 countries

Rate of exchange: January-February 2007

	Country	Title	Date	Programme duration	Plan/Project	Budget info	Total budget	Size of poultry sector (2005)
	Middle East							
1	***Yemen***	EMERGENCY PLAN OF ACTION: BIRD FLU PRECAUTIONARY MEASURES (A 318)	Oct-05	Not specified	National Contingency Plan for Avian Influenza	• **Component 1. Jointly Implemented Activities (Ministry of Agriculture and Ministry of Health)**: Y.R.(Yemeni Riyals) 7,000,000 (US$ 0.036 million) The budget includes the following activities:1) Establishment of coordination among the overseen operational structure (Public, Private, Local Authorities, International Organisations and Organisations of the Civil Society; 2)Information and communication; 3)Monitoring of the epidemiological situation; 4) Regular meeting of technical committees • **Component 2. Activities to be implemented by the Ministry of Agriculture and Irrigation** (MoA&I): Y.R.109,923,240 (US$ 0.561 million) The budget includes the following activities: 1) Ban of importation of live birds and poultry and their products from affected countries; 2) Strengthening the surveillance; 3) Conducting a field survey to assess the current health situation of the poultry; 4) Control and monitoring the entry points; 5) Prohibiting entry of personal birds for affected countries 6) Applying the approved health requirements according to the recommendations of the OIE 7) Low implementation 8) Raising the awareness among Veterinarians, tech. staff and the poultry breeders 9) Communication with international organisations 10) Providing the needs for surveillance activities 11) Strengthening the Central Veterinary Laboratory 12) Intensified monitoring of the migratory birds 13) Preparing an urgent plan to contain the disease • **Component 3. Activities to be implemented by the Ministry of Public Health and Population** (MoPH&P): Y.R. 471 (US$ 2.41 million) The budget includes the following activities: 1) Strengthening general prevention; 2) Raising the preparedness of the country entry points; 3) Raising the awareness among the health workers; 4) Strengthening the surveillance; 5) Strengthening the diagnostic capacities of the Central Public Health Laboratory (CPHL and its branches in the govern 6) Surveillance of the international labours and students 7) Raising awareness among the public and travellers; 8) Preparing a Medical Emergency Preparedness Procedure (MEPP) to contain the disease	**Y.R. 589 million (US$3.007 million)**	**Poultry population: 37 million**

	Country	Title	Date	Programme duration	Source	Budget info	Total budget	Size of poultry sector (2005)
	South Asia							
1	***Afghanistan***	AVIAN INFLUENZA CONTROL PROJECT (A206a)	Apr-06	Oct 2006- Dec 2007	WB-APL/GPAI	**Animal Health Component** (US$5.2 million) **Human Health Component** (US$ 4.3 million) **Management, Communication and Public Awareness** (US$2.6 million)	**US$ 12.1 million**	**Poultry population: 8.4 million**
2	***India***	INFLUENZA PANDEMIC PREPAREDNESS AND RESPONSE PLAN (DRAFT) (A319)	No date	Not specified	National Contingency Plan for Human Pandemic Inluenza (DRAFT)	**No budget estimation.** Plan for the prevention and control of Human Pandemic	**No budget estimation**	**Poultry population: 430 million**
3	***Nepal***	AVIAN INFLUENZA CONTROL PROJECT (A320)	Dec-06	Oct 2006- July 2011	WB-APL/GPAI	**1.Animal Health** (US$ 6.12 million) 1.1, Surveillance (US$ 0.74 million) 1.2. Prevention and Containment (US$ 0.76 million) 1.3. Laboratory Capacity (US$ 3.37 million) 1.4. Vetennary Services (US$ 1.15 million) 1.5. Compensation Fund (US$ 0.10 million) **2. HumanHealth** (US$ 6.34 million) 2.1. Surveillance and Laboratory (US$ 3.30 million) 2.2. Prevention and Containment (US$ 0.98 million) 2.3. Health Care Delivery System (US$ 2.06 million) **3. Communications** (US$ 1.65 million) 3.1. Animal Health Communications (US$ 0.62 million) 3.2. HumanHealth Communications (US$ 0.67 million) 3.3 Cross-cutting Issues (US$ 0.36 million) **4. Project Management** (US$ 1.72 million) 4.1. Animal Health Support (US$ 1.21 million) 4.2. HumanHealth Support (US$ 0.5 1 million)	**US$ 15.83 million (without contigencies)**	**Poultry population: 22.79 million**
	East Asia & Pacific							
4	***China***					**Project not available**	**Project not available**	**Poultry population: 4,360.24 million**
5	***Indonesia***	NATIONAL STRATEGIC PLAN FOR AVIAN INFLUENZA CONTROL AND PANDEMIC INFLUENZA PREPAREDNESS 2006-2008 (A328)	Jan-06	2006-2008	National Contingency Plan for Avian Influenza	**National Avian Influenza control strategy** • **Highly Pathogenic Avian Influenza (HPAI) Control in Animals:** Rp (rupiah) 3,334.7 million (US$ 75.462 million) • **Management of Human Cases of AI:** Rp 824.41 million (US$ 18.656 million) • **Protection of High-Risk Groups:** Rp 73.4 million (US$ 1.661 million) • **Epidemiological Surveillance on Animals and Humans:** Rp 705.52 million (US$ 15.966 million) • **Restructuring the Poultry Industry System:** Rp 3.7 million (US$ 0.084 million) • **Risk Communication, Information and Public Awareness:** Rp 390.92 million (US$ 8.846 million) • **Strengthening Supporting Laws:** Rp 11.5 million (US$ 0.260 million) • **Capacity Building:** Rp 672.27 million (US$ 15.213 million) • **Action Research:** Rp 154.5 million (US$ 3.496 million) • **Monitoring and Evaluation:** Rp 21.9 million (US$ 0.496 million) **Subtototal: Rp 6,192.82 million (US$ 140.141 million)** **National Human Pandemic Influenza preparedness policy** • **Strengthening Sustainable Management:** Rp 68.9 million (US$ 1.56 million) • **Strengthening Surveillance on Animals and Humans:** Rp 348.9 million (US$ 7.899 million) • **Prevention and Control:** Rp 923.9 million (US$ 20.917 million) • **Strengthening Health Service Response Capacity:** Rp 822.3 million (US$ 18.617 million) • **Risk Communication, Information and Public Awareness:** Rp 273 million (US$ 6.181 million) **Subtotal: Rp 2437 million (US$ 55.174 million)**	**Rp 8,629.82 million (US$195.314 million)**	**Poultry population: 1,249. 42 million**

6	***Lao PDR***	AVIAN AND HUMAN INFLUENZA CONTROL AND PREPAREDNESS PROJECT (A207)	Jun-06	Sep 2006-Apr 2010	WB-APL/GPAI	**Animal Health** (US$ 5.35 million). **Human Health - Surveillance and Response** (US$ 1.10 million). **Human Health - Curative Services** (US$ 2.54 million). **Information, Education and Communication** (US$1.87 million). **Program Coordination and Regulatory Framework** (US$ 2.69 million).	**13.56 million US$**	**Poultry population: 19.8 million**
7	***Malaysia***	NATIONAL INFLUENZA PANDEMIC PREPAREDNESS PLAN (A321)	Jan-06	Not specified	National Contingency Plan for Human Pandemic Inluenza	**No budget estimation.** Guidelines for preparedness and response plan for Human Pandemic Influenza .	**No budget estimation**	**Poultry population: 185 million**
8	***Philippines (Republic of)***	PREPAREDNESS AND RESPONSE PLAN FOR AVIAN AND PANDEMIC INFLUENZA (A322a)	Oct-05	Not specified	National Contingency Plan for Human Pandemic Inluenza	**No budget estimation.** Guidelines for preparedness and response plan for Human Pandemic Influenza .	**No budget estimation**	**Poultry population: 136 million**
9	***Thailand***	NATIONAL STRATEGIC PLAN FOR AVIAN INFLUENZA CONTROL AND INFLUENZA PANDEMIC PREPAREDNESS, 2005 - 2007 (A323)	Jan-05	2005-2007	National Contingency Plan for Avian Influenza	**Development of a disease free poultry management system:** Baths 700 million (US$ 19.5 million) **Disease surveillance and response during outbreaks:** Baths 1,560 million (US$ 43.5 million) **Knowledge generation and management and Develop integrated management system and mechanism:** Baths325million (US$ 9.1million) **Capacity building of organisations and manpower:** Baths 1,201 million (US$ 33.5 million) **Create understanding and participation of the civil society and private sectors:** Baths 240 million (US$6.7million)	**Baths 4,026 million (US$112.3 million)**	**Poultry population: 260 million**
10	***Vietnam (Socialist Republic of)***	NATIONAL PREPAREDNESS PLAN IN RESPONSE TO AVIAN FLU EPIDEMIC H5N1 AND HUMAN INFLUENZA PANDEMIC (A326)	Sep-05	2005-2006	National Contingency Plan for Human Pandemic Inluenza	**Prevention sector:** VND 603 billion (US$ 37.746 million) **Treatment sector:** VND 3,600 billion (US$ 225.352 million) **Taminflu:** VND 310 billion (US$ 19.405 million) **Other:** VND 386 billion (US$ 24.163 million)	**VND 4,916 billion (US$307.731 million)**	**Poultry population: 153.93 million**
10	***Vietnam (Socialist Republic of)***	INTEGRATED NATIONAL PLAN FOR AI CONTROL AND HUMAN INFLUENZA PANDEMIC PREPAREDNESS AND RESPONSE,2006-2008 (A271)	Jan-06	2006-2008	National Contingency Plan for Avian Influenza	**I. Enhancing Coordinated Prevention and Preparedness Capability: US$** 35 million **II. Strengthening Surveillance and Early Warning System: US$** 61.5 million **III. Strengthening HPAI Control and Outbreak Containment: US$** 169 million	**US$ 266 million**	**Poultry population: 153.93million**
10	***Vietnam (Socialist Republic of)***	INTEGRATED NATIONAL OPERATIONAL PROGRAM FOR AVIAN AND HUMAN INFLUENZA (OPI): 2006-2010 (A270)	May-06	2006-2010	Integrated Operational Program for Avian Influenza	**I. Enhanced Coordination Activities: US$ 26,612** • National preparedness: US$ 590 • Policy and strategy development: US$ 134 • Program Coordination: US$ 5,406 • Public awareness and information, education and communication: US$ 4,200 • Program monitoring and evaluation: US$ 1,800 • Support for regional activities and international agencies: US$ 17,482 **II .HAPI Control and Eradication in the Agricultural Sector: US$ 83,737.1** • Strengthening Veterinary Services (capacity building): US$ 15,763 • Disease Control: US$ 55,160 • Surveillance and Epidemiological Investigation: US$ 4,443.8 • Poultry sector restructuring: US$ 8,370 **III. Influenza Prevention and Pandemic Preparedness in the Health Sector: US$ 96,230** • Strengthening Surveillance and Response: US$ 37,925 • Strengthening Diagnostic Capacity: US$ 14,442 • Strengthening Curative Care System: US$ 34,253 • Improving Research: US$ 9,610	**US$ 209 million**	**Poultry population: 153.93 million**
10	***Vietnam (Socialist Republic of)***	AVIAN INFLUENZA EMERGENCY RECOVERY PROJECT (A204)	Jul-04	2004-2006	WB-APL/GPAI	**Strengthening Diagnostic Capacity, Disease Surveillance, and HPAI Research:** US$ 2.760 million **Poultry Sector Rehabilitation:** US$ 2.13 million US$ **Public Awareness and Information:** US$ 0.95 million US$ **Project Management:** US$ 0.360 million	**US$ 6.2 million**	**Poultry population: 153.93 million**

10 countries

Note: West bank and Gaza: project approved but not available at the moment

Rate of exchange: January-February 2007

	Country	Title	Date	Programme duration	Source	Budget info	Total budget	Size of poultry sector (2005)
	Europe & Central Asia							
1	***Albania***	AVIAN INFLUENZA CONTROL AND HUMAN PANDEMIC PREPAREDNESS AND RESPONSE PROJECT (A201)	Jun-06	Jul 2006- Jun 2009	WB-APL/GPAI	**Component 1: Public Awareness and Information Campaign** (US$ 0.461 million) **Component 2: Animal Health** (US$ 3.698 million) **Component 3: Human Health Component** (US$ 1.6 million) **Component 4: Support to Avian Influenza Task Force** (US$ 341.2 million)	**US$ 6.10 million**	**Poultry population: 4.67 million**
2	***Armenia***	AVIAN INFLUENZA PREPAREDNESS (AIP) PROJECT (A209)	May-06	Jun 2006-May 2009	WB-APL/GPAI	**1. Animal Health Component:** US$ 5.55 million **2. Human Health Component:** US$ 2.745 million **3. Public Awareness and Communication Support:** US$ 0.932 million	**US$ 9.229 million (without contingencies)**	**Poultry population: 4.59 million**
3	***Georgia***	AVIAN INFLUENZA CONTROL AND HUMAN PANDEMIC PREPAREDNESS AND RESPONSE PROJECT (A208)	May-06	May 2006-Aug 2009	WB-APL/GPAI	**Animal Health Component** (US$ 5.183 million) **Human Health Component** (US$ 4.317 million) **Public Awareness and Information Component** (US$ 0.9 million)	**US$ 10.4 million**	**Poultry population: 9.1 million**
4	***Kyrgyz Republic***	AVIAN INFLUENZA CONTROL AND HUMAN PANDEMIC PREPAREDNESS AND RESPONSE PROJECT (A205)	Jan-06	Mar 2006-Dec 2009	WB-APL/GPAI	**1. Animal Health** (US$ 2.88 million) **2. Human Health** (US$ 2.30 million) **3. Public Awareness and Information** (US$ 0.44 million) **4. Implementation Support and Monitoring & Evaluation** (US$ 0.38 million)	**US$ 6 million (without contingencies)**	**Poulrty population: 4.12 million**
5	***Moldova***	AVIAN INFLUENZA CONTROL AND HUMAN PANDEMIC PREPAREDNESS AND RESPONSE (AIHP) PROJECT (A199)	May-06	Sept 2006-Dec 2008	WB-APL/GPAI	**Component 1: Animal Health** (US$ 3.6 million) **Component 2: Human Health** (US$ 3.7 million) **Component 3: Public Information and Awareness** (US$ 1.3 million) **Component 4: Implementation support and monitoring & evaluation** (US$ 0.55 million) **Unallocated fund** (US$ 1.45 million)	**US$ 10.6 million**	**Poultry population: 17.44 million heads**
6	***Romania***	AVIAN INFLUENZA CONTROL AND HUMAN PANDEMIC PREPAREDNESS AND RESPONSE PROJECT (A93a)	Sep-06	Nov 2006-Aug 2009	WB-APL/GPAI	**Animal Health: EUR 14.3 million** (US$ 18.781million) **Human Health:EUR 19.80 million** (US$ 26.003 million) **Public Awareness and Communications: EUR 1.641 million** (US$ 21.554 million) **Implementation Support, Monitoring and Evaluation: EUR 1.824 million** (US$ 2.395 million)	**Euro 37.5 million (US$47.7 million)**	**Poultry population: 87.01 million**
7	***Tajikistan (Republic of)***	AVIAN INFLUENZA CONTROL AND HUMAN PANDEMIC PREPAREDNESS AND RESPONSE PROJECT (A206)	Jun-06	Sep 2006-Dec 2009	WB-APL/GPAI	**Component 1 - Public Awareness and Information** (US$ 1.2 million) **Component 2 - Animal Health** (US$ 3 million) **Component 3 - Human Health** (US$ 2.3 million) **Component 4 - Implementation Support and Monitoring Evaluation Contingency** (US$ 0.3 million)	**US$ 6.8 million**	**Poultry population: 2.3 million**
8	***Turkey***	AVIAN INFLUENZA AND HUMAN PANDEMIC PREPAREDNESS AND RESPONSE PROJECT (A200)	Mar-06	Jun 2006-Jul 2010	WB-APL/GPAI	**ANIMAL HEALTH COMPONENT:** US$ 30.86 million **HUMAN HEALTH COMPONENT:** US$ 20.84 million **PUBLIC AWARENESS AND COORDINATION SUPPORT COMPONENT:** US$ 2,78 million	**US$ 54.5 million (without contigencies)**	**Poultry population: 296.88 million**

8 countries

Rate of exchange: January-February 2007

	Country	Title	Date	Programme duration	Source	Budget info	Total budget	Size of poultry sector (2005)
	Latin America							
1	***Bolivia***	PLAN NACIONAL PARA PANDEMIA DE INFLUENZA Y GRIPE AVIAR (A325)	Oct-05	2005-2008	National Contingency Plan for Human Pandemic Inluenza	**No budget estimation.** Guidelines for preparedness and response plan for Human Pandemic Influenza.	**No budget estimation**	**Poultry population: 75 million**
2	***Uruguay***	PLAN DE CONTINGENTIA EN INFLUENZA AVIAR (A324)	2004	Not specified	National Contingency Plan for Avian Influenza	**No budget estimation.** Guideline for prevention and control of AI in animals	**No budget estimation**	**Poultry population: 14 million**

2 countries

Annex 5: Global outbreak costs: scenarios, assumptions and results

Instructions to users

Objective:

This spreadsheet has been developed to serve as a working tool for the estimation of the costs of HPAI outbreaks at a global, regional and individual country level under different scenarios and assumptions.
The idea is that, as the epidemic occurence of HPAI is constantly changing, the scenarios and assumptions can ve varied to reflect more accurately the evolving reality.
Similarly, the data on which the current spreadsheet is based can be adjusted as new data and evidence from other research comes to light.

Scenarios and assumptions:

The current scenarios are as follows:
Scenario 1 (most likely scenario): assumes that, in the event of a disaese outbreak, the resulting impact will be between the low impact and high impact scenarios
Scenario 2 (low impact)
Scenario 3 (high impact)

In addition, there are 3 scenarios on the geographical scale of the outbreak: Scenario A; Scenario B; Scenario C.
These are based on the country classification of the "Global Strategy for Progressive Control of HPAI" (A40), and on the "AI Control and Eradication: FAO proposal for a global programme" (A42).
Current country coverage has been adjusted to reflect the current status of the geographical presence of the disease (based on OIE/WAHID data).

The variables on which the above scenarios depend are illustrated in the '**Assumptions outbreak costs**' worksheet.

Results:

A differentiation is made between direct impacts and losses and indirect impacts.
Results on the former are presented in the '**Direct outbreak costs**' worksheet, for the latter in the '**Indirect outbreak costs**' worksheet.

The direct outbreak costs are given for OIE developing/transition countries only (scope of this project).
The indirect impact is given for the world.
The underlying assumption is that, this being a transboundary disease, the wider economic effects (in terms of trade loss, loss in other sectors such as travel/tourism and the wider costs of a pandemic) transcend throughout the world.

Data sources/notes:

All sources of data are indicated in the notes under each worksheet.
The worksheets 'Vietnam HPAI' and 'Nigeria HPAI' contain more detailed data and calculations for the direct production costs and losses in these countries, based on our case studies.
The worksheet 'global HPAI' contains more detailed data and calculations for the indirect costs and losses at a global level, based on our literature review.
The worksheet 'pandemic effects' contains more detailed data and calculations for the pandemic effects.

© Spreadsheet developed by Agra CEAS Consulting for the OIE.

Disease: HPAI	ACTUAL				ASSUMPTIONS		
	Baseline (Vietnam)	**Baseline (Nigeria)**	**Baseline (global)**		**Impact: scenario 1 (most likely)**	**Impact: scenario 2 (low impact)**	**Impact: scenario 3 (high impact)**
Duration of impact (years)	2+	1+			2	1	3
Rate of disease spread (a)					moderate	slow	rapid
Coverage (countries) (b)					scenario A	scenario A	scenario A
					scenario B	scenario B	scenario B
					scenario C	scenario C	scenario C
Direct production costs/losses:							
● Direct losses (c)							
% of birds culled	7-17%	2%	2%		15%	7%	25%
average market value per head (US$)	2.56	5.49		global	4	4	4
				Asia	2.5	2.5	2.5
				rest of world	6	6	6
culling/disposal costs per head (US$)	0.25	1.00		global	0.7	0.7	0.7
				Asia	0.3	0.3	0.3
				rest of world	1	1	1
control costs per head (US$)	0.19	0.38		global	0.3	0.3	0.3
				Asia	0.2	0.2	0.2
				rest of world	0.4	0.4	0.4
● Consequential on-farm losses (d)							
% of birds culled	7-17%				15%	7%	25%
monthly income from activity (per head) (US$)	0.96				2.00	2.00	2.00
duration (number of months)	3				3	1	6
Indirect costs							
Ripple (e)							
● Fall in domestic prices / demand (e)							
% rate of sales volume loss (per month)	up to 50%				20%	10%	40%
% rate of price fall (per month)	up to 50%				20%	10%	40%
duration (months)	3				3	1	6
● Loss of exports / market access (f)							
% rate of trade volume loss (per month)			0.4%		0.5%	0.2%	1.0%
% rate of price fall (per month)			0.8%		1.0%	0.5%	2.0%
duration (months)			12		24	12	36
Spill-over (g)							
● Fall in tourism / travel							
% rate of tourism income loss (per month)			0.4%		0.4%	0.2%	1.0%
duration (months)			12		12	6	24
Wider society (h)							
● Economic impact (% fall in GDP)							
15% attack rate			0.7%		0.7%	0.4%	1.0%
35% attach rate			1.6%		1.6%	1.0%	3.0%

Notes:

(a) Dependent on density of poultry popuplation, production system (intensive or extensive), weather conditions, presence of wild reservoirs and other natural risk factors.
Also, veterinary preparedness (surveillance levels, early detection, application of movement controls and other control measures etc.)

(b) Country classification based on A40 (Global Strategy for Progressive Control of HPAI), A42 (AI Control and Eradication: FAO proposal for a global programme) and current status (OIE, WAHID).
As at Nov 2005, the strategy was focussed on 3 groups of countries:
1) H5N1 infected countries (SE Asia: Cambodia, China, Indonesia, Laos, Thailand, Vietnam; Mongolia, Kazakshtan, Russia, Turkey and Romania)
2) Non-infected at immediate risk countries - includes those free of infection after having stamped out HPAI (DPR Korea, Malaysia, and Rep of Korea)
and those never infected (SE Asia: Brunei, Myanmar, Singapore and Philippines; S. Asia: Bangladesh, Bhutan, India, Maldives, Nepal, Sri Lanka)
3) Non-infected new countries at risk: includes the other regions of the world

(c) Includes culling (value of culled animals and culling/disposal) and control costs - excludes 'other direct production' or 'consequential' losses.

(d) Depends on period of non-activity during a moratorium on re-stocking
Excludes upstream/downstream sectors (poultry feed, processors, vet medicines etc.)

(e) Total net impact. Depends on impact of outbreak on consumer demand and price levels and proprotion of producers/production affected; some unaffected producers may actually gain from higher prices.
Also, depends on the point of return to pre-outbreak levels after the end of the crisis - duration is therefore the total number of months with no/reduced activity.
It is possible that some business will exit from the sector while others will expand (as has been the case in practice).
Assumes, however, than in net macro-economic terms supply will resume at pre-outbreak levels.

(f) Total net impact. Same assumptions apply as for domestic trade. Some countries may gain from increased exports (of poultry or substitute meats) and/or higher prices.

(g) Costs to the economic sectors of tourism/travel only covered here. Other economic sectors (e.g. services) excluded.

(h) Economic impact based on public health effects of a pandemic influenza. Source of baseline (global): US economic impact (A5). Range assumes a 15% to 35% attack rate.

Disease: HPAI				**in '000 US$**					**in '000 US$**		
			Baseline						**Impact: scenario 1 (most likely)**		
	Poultry stock ('000 head)	**Poultry stock losses (%)**	**Poultry value losses**	**Culling/ Disposal costs**	**Control costs**	***Total impact***	**Poultry stock losses (%)**	**Poultry value losses**	**Culling/ Disposal costs**	**Control costs**	***Total impact***
	2005	*2004-05 avg*	*2004-05 avg*	*2004-05 avg*	*2004-05 avg*	*2004-05 avg*					
case study 1 (Asia)	243,000	13.50%	84,103	8,200	6,308	***98,610***	15%	91,125	10,935	7,290	***109,350***
avg cost per head			*2.56*	*0.25*	*0.19*			*2.5*	*0.3*	*0.2*	
	2006 est.	*2006 est.*	*2006 est.*	*2006 est.*	*2006 est.*	*2006 est.*					
case study 2 (Africa)	140,000	2%	14,505	2,640	1,015	***18,161***	15%	126,000	21,000	8,400	***155,400***
avg cost per head			*5.49*	*1.00*	*0.38*			*6*	*1*	*0.4*	
Direct production costs/losses: Global impact, annual (i)											
avg cost per head								*4*	*0.7*	*0.3*	
scenario A (ii)							15%	***4,271,540***	***747,519***	***320,365***	***5,339,425***
scenario B (iii)							15%	***4,898,934***	***857,313***	***367,420***	***6,123,668***
scenario C (iv)							15%	***7,763,260***	***1,358,571***	***582,245***	***9,704,075***
Direct production costs/losses: Global impact, total (i)											
scenario A (ii)								***8,543,080***	***1,495,039***	***640,731***	***10,678,850***
scenario B (iii)								***9,797,868***	***1,714,627***	***734,840***	***12,247,335***
scenario C (iv)								***15,526,520***	***2,717,141***	***1,164,489***	***19,408,151***
Consequential on-farm losses: Global impact, annual (i)											
avg income loss per head											*6*
scenario A (ii)							15%				***6,407,310***
scenario B (iii)							15%				***7,348,401***
scenario C (iv)							15%				***11,644,890***
Consequential on-farm losses: Global impact, total (i)											
scenario A (ii)											***12,814,619***
scenario B (iii)											***14,696,802***
scenario C (iv)											***23,289,781***
Total direct impact including consequential on-farm losses, annual (i)											
scenario A (ii)											***11,746,734***
scenario B (iii)											***13,472,069***
scenario C (iv)											***21,348,966***
Total direct impact including consequential on-farm losses, total (i)											
scenario A (ii)											***23,493,469***
scenario B (iii)											***26,944,137***
scenario C (iv)											***42,697,931***

	Individual countries:									in '000 US$			
				Total poultry stock , 2005 (v)					Impact: scenario 1 (most likely)				
			Poultry stock ('000 head) (v)		*Scenario A countries*	*Scenario B countries*	*Scenario C countries*		Poultry stock losses (%)	Poultry value losses	Culling/ Disposal costs	Control costs	*Total impact*
				('000 head)	*7,119,233*	*8,164,890*	*12,938,767*						
				(% of total)	*55.0%*	*63.1%*	*100.0%*						
1	Afghanistan		8,400						15%	5,040	882	378	***6,300***
2	Albania		4,670						15%	2,802	490	210	***3,503***
3	Algeria		125,000						15%	75,000	13,125	5,625	***93,750***
4	Angola		6,800						15%	4,080	714	306	***5,100***
5	**Argentina**		95,000						15%	57,000	9,975	4,275	***71,250***
6	Armenia		4,590						15%	2,754	482	207	***3,443***
7	Azerbaijan		17,553						15%	10,532	1,843	790	***13,165***
8	Bahrain		470						15%	282	49	21	***353***
9	Bangladesh		142,000						15%	85,200	14,910	6,390	***106,500***
10	Barbados		3,400						15%	2,040	357	153	***2,550***
11	Belarus		24,600						15%	14,760	2,583	1,107	***18,450***
12	Belize		1,600						15%	960	168	72	***1,200***
13	Benin		13,000						15%	7,800	1,365	585	***9,750***
14	Bhutan		230						15%	138	24	10	***173***
15	Bolivia		75,000						15%	45,000	7,875	3,375	***56,250***
16	Bosnia-Herz		9,000						15%	5,400	945	405	***6,750***
17	Botswana		4,000						15%	2,400	420	180	***3,000***
18	Brazil		1,100,000						15%	660,000	115,500	49,500	***825,000***
19	Brunei		13,000						15%	7,800	1,365	585	***9,750***
20	Bulgaria		17,159						15%	10,295	1,802	772	***12,869***
21	Burkina Faso		25,739						15%	15,443	2,703	1,158	***19,304***
22	Burundi		4,300						15%	2,580	452	194	***3,225***
23	Cambodia		15,000						15%	9,000	1,575	675	***11,250***
24	Cameroon		31,000						15%	18,600	3,255	1,395	***23,250***
25	Central Afr. Rep.		4,769						15%	2,861	501	215	***3,577***
26	Chad		5,200						15%	3,120	546	234	***3,900***
27	Chile		95,000						15%	57,000	9,975	4,275	***71,250***
28	China		4,360,243						15%	2,616,146	457,826	196,211	***3,270,182***
29	Colombia		150,000						15%	90,000	15,750	6,750	***112,500***
30	Comoros		510						15%	306	54	23	***383***
31	Congo		2,400						15%	1,440	252	108	***1,800***
32	Congo Dem. Rep		19,769						15%	11,861	2,076	890	***14,827***
33	Costa Rica		19,500						15%	11,700	2,048	878	***14,625***
34	Cote d'Ivoire		33,000						15%	19,800	3,465	1,485	***24,750***
35	Croatia		10,640						15%	6,384	1,117	479	***7,980***
36	Cuba		27,440						15%	16,464	2,881	1,235	***20,580***
37	Djibouti								15%	0	0	0	***0***
38	Dominican Rep		47,500						15%	28,500	4,988	2,138	***35,625***
39	Ecuador		104,217						15%	62,530	10,943	4,690	***78,163***
40	Egypt		95,000						15%	57,000	9,975	4,275	***71,250***
41	El Salvador		13,437						15%	8,062	1,411	605	***10,078***
42	Eq. Guinea		320						15%	192	34	14	***240***
43	Eritrea		1,370						15%	822	144	62	***1,028***
44	Ethiopia		39,000						15%	23,400	4,095	1,755	***29,250***
45	FYR Macedonia		2,617						15%	1,570	275	118	***1,963***
46	Gabon		3,100						15%	1,860	326	140	***2,325***
47	Gambia		650						15%	390	68	29	***488***
48	Georgia		9,100						15%	5,460	956	410	***6,825***
49	Ghana		30,000						15%	18,000	3,150	1,350	***22,500***
50	Guatemala		27,000						15%	16,200	2,835	1,215	***20,250***
51	Guinea		15,865						15%	9,519	1,666	714	***11,899***
52	Guinea Bissau		1,600						15%	960	168	72	***1,200***
53	Guyana		20,000						15%	12,000	2,100	900	***15,000***
54	Haiti		5,500						15%	3,300	578	248	***4,125***
55	Honduras		18,700						15%	11,220	1,964	842	***14,025***
56	India		430,000						15%	258,000	45,150	19,350	***322,500***
57	Indonesia		1,249,426						15%	749,656	131,190	56,224	***937,070***
58	Iran		280,000						15%	168,000	29,400	12,600	***210,000***
59	Iraq		33,000						15%	19,800	3,465	1,485	***24,750***
60	Jamaica		12,500						15%	7,500	1,313	563	***9,375***
61	Jordan		25,000						15%	15,000	2,625	1,125	***18,750***
62	Kazakhstan		25,500						15%	15,300	2,678	1,148	***19,125***
63	Kenya		28,657						15%	17,194	3,009	1,290	***21,493***
64	Korea North		21,000						15%	12,600	2,205	945	***15,750***
65	Korea South		110,000						15%	66,000	11,550	4,950	***82,500***
66	Kuwait		32,500						15%	19,500	3,413	1,463	***24,375***
67	Kyrgyzstan		4,121						15%	2,473	433	185	***3,091***
68	Laos		19,800						15%	11,880	2,079	891	***14,850***
69	Lebanon		35,000						15%	21,000	3,675	1,575	***26,250***
70	Lesotho		1,800						15%	1,080	189	81	***1,350***

71	Libya		25,000						15%	15,000	2,625	1,125	***18,750***
72	Madagascar		24,000						15%	14,400	2,520	1,080	***18,000***
73	Malawi		15,200						15%	9,120	1,596	684	***11,400***
74	Malaysia		185,000						15%	111,000	19,425	8,325	***138,750***
75	Mali		31,000						15%	18,600	3,255	1,395	***23,250***
76	Mauritania		4,200						15%	2,520	441	189	***3,150***
77	Mauritius		9,800						15%	5,880	1,029	441	***7,350***
78	Mexico		425,000						15%	255,000	44,625	19,125	***318,750***
79	Moldova		17,442						15%	10,465	1,831	785	***13,082***
80	Mongolia		30						15%	18	3	1	***23***
81	Morocco		137,000						15%	82,200	14,385	6,165	***102,750***
82	Mozambique		28,000						15%	16,800	2,940	1,260	***21,000***
83	Myanmar		82,000						15%	49,200	8,610	3,690	***61,500***
84	Namibia		3,500						15%	2,100	368	158	***2,625***
85	Nepal		22,790						15%	13,674	2,393	1,026	***17,093***
86	New Caledonia		600						15%	360	63	27	***450***
87	Nicaragua		18,000						15%	10,800	1,890	810	***13,500***
88	Niger		25,000						15%	15,000	2,625	1,125	***18,750***
89	**Nigeria**		150,700						15%	90,420	15,824	6,782	***113,025***
90	Oman		4,200						15%	2,520	441	189	***3,150***
91	Pakistan		166,000						15%	99,600	17,430	7,470	***124,500***
92	Panama		14,000						15%	8,400	1,470	630	***10,500***
93	Paraguay		17,000						15%	10,200	1,785	765	***12,750***
94	Peru		99,255						15%	59,553	10,422	4,466	***74,441***
95	Philippines		136,001						15%	81,601	14,280	6,120	***102,001***
96	Qatar		4,500						15%	2,700	473	203	***3,375***
97	**Romania**		87,014						15%	52,208	9,136	3,916	***65,261***
98	Russia		328,707						15%	197,224	34,514	14,792	***246,530***
99	Rwanda		2,000						15%	1,200	210	90	***1,500***
100	Sao Tome		290						15%	174	30	13	***218***
101	Saudi Arabia		141,000						15%	84,600	14,805	6,345	***105,750***
102	Senegal		26,959						15%	16,175	2,831	1,213	***20,219***
103	Serbia-Mont		15,221						15%	9,133	1,598	685	***11,416***
104	Sierra Leone		7,500						15%	4,500	788	338	***5,625***
105	Singapore		2,000						15%	1,200	210	90	***1,500***
106	Somalia		3,400						15%	2,040	357	153	***2,550***
107	South Africa		121,000						15%	72,600	12,705	5,445	***90,750***
108	Sri Lanka		11,636						15%	6,982	1,222	524	***8,727***
109	Sudan		37,000						15%	22,200	3,885	1,665	***27,750***
110	Suriname		3,800						15%	2,280	399	171	***2,850***
111	Swaziland		3,200						15%	1,920	336	144	***2,400***
112	Syria		23,795						15%	14,277	2,498	1,071	***17,846***
113	Taipei China (Taiwan)								15%	0	0	0	***0***
114	Tajikistan		2,296						15%	1,378	241	103	***1,722***
115	Tanzania		30,000						15%	18,000	3,150	1,350	***22,500***
116	Thailand		260,000						15%	156,000	27,300	11,700	***195,000***
117	Togo		9,000						15%	5,400	945	405	***6,750***
118	Trinidad-Tobago		28,200						15%	16,920	2,961	1,269	***21,150***
119	Tunisia		64,000						15%	38,400	6,720	2,880	***48,000***
120	Turkey		296,876						15%	178,126	31,172	13,359	***222,657***
121	Turkmenistan		7,000						15%	4,200	735	315	***5,250***
122	Uganda		32,600						15%	19,560	3,423	1,467	***24,450***
123	Ukraine		131,976						15%	79,186	13,857	5,939	***98,982***
124	UAE		15,000						15%	9,000	1,575	675	***11,250***
125	Uruguay		14,000						15%	8,400	1,470	630	***10,500***
126	Uzbekistan		20,540						15%	12,324	2,157	924	***15,405***
127	Vanuatu		340						15%	204	36	15	***255***
128	Venezuela		110,000						15%	66,000	11,550	4,950	***82,500***
129	**Vietnam**		153,937						15%	92,362	16,163	6,927	***115,453***
130	Yemen		37,000						15%	22,200	3,885	1,665	***27,750***
131	Zambia		30,000						15%	18,000	3,150	1,350	***22,500***
132	Zimbabwe		23,000						15%	13,800	2,415	1,035	***17,250***
	TOTAL		**12,938,767**							**7,763,260**	**1,358,571**	**582,245**	***9,704,075***

Notes:

(i) The 'global' impact is given in a range, depending on 3 scenarios in terms of country coverage (scenarios A to C).
Furthermore, it is indicated per year and in total, depending on the assumptions for duration of the epidemic - see 'assumptions outbreak costs'
Includes animal value losses, culling/disposal and control costs

(ii) Scenario A Includes the following countries: Cambodia, China, Indonesia, Laos, Thailand, Vietnam, S. Korea; Mongolia, Kazakshtan, Russia, Turkey, Romania; Nigeria, Niger, Sudan

(iii) Scenario B includes the countries of Note (b) above plus : N korea, Malyasia, Brunei, Myanmar, Singapore, Philippines; Bangladesh, Bhutan, India, Nepal, Sri Lanka

(iv) Scenario C includes all OIE developing country members (132 countries in total)

(v) Latest data available, source FAOSTAT. Chicken numbers: since 2005 FAOSTAT does not differentiate any more between broilers and layers (double counting between the 2 categories was possible in earlier years).

	in '000 US$					in '000 US$			
Impact: scenario 2 (low impact)					Impact: scenario 3 (high impact)				
Poultry stock losses (%)	Poultry value losses	Culling/ Disposal costs	Control costs	*Total impact*	Poultry stock losses (%)	Poultry value losses	Culling/ Disposal costs	Control costs	*Total impact*
7%	42,525	5,103	3,402	51,030	25%	151,875	18,225	12,150	182,250
	2.5	0.3	0.2			2.5	0.3	0.2	
7%	58,800	9,800	3,920	72,520	25%	210,000	35,000	14,000	259,000
	6	1	0.4			6	1	0.4	
	4	0.7	0.3			4	0.7	0.3	
7%	1,993,385	348,842	149,504	2,491,732	25%	7,119,233	1,245,866	533,942	8,899,041
7%	2,286,169	400,080	171,463	2,857,712	25%	8,164,890	1,428,856	612,367	10,206,113
7%	3,622,855	634,000	271,714	4,528,568	25%	12,938,767	2,264,284	970,408	16,173,459
	1,993,385	348,842	149,504	2,491,732		21,357,699	3,737,597	1,601,827	26,697,124
	2,286,169	400,080	171,463	2,857,712		24,494,670	4,286,567	1,837,100	30,618,338
	3,622,855	634,000	271,714	4,528,568		38,816,301	6,792,853	2,911,223	48,520,376
				2					12
7%				996,693	25%				21,357,699
7%				1,143,085	25%				24,494,670
7%				1,811,427	25%				38,816,301
				996,693					64,073,097
				1,143,085					73,484,010
				1,811,427					116,448,903
				3,488,424					30,256,740
				4,000,796					34,700,783
				6,339,996					54,989,760
				3,488,424					90,770,221
				4,000,796					104,102,348
				6,339,996					164,969,279

	in '000 US$					in '000 US$			
Impact: scenario 2 (low impact)					Impact: scenario 3 (high impact)				
Poultry stock losses (%)	Poultry value losses	Culling/ Disposal costs	Control costs	*Total impact*	Poultry stock losses (%)	Poultry value losses	Culling/ Disposal costs	Control costs	*Total impact*
7%	2,352	412	176	***2,940***	25%	8,400	1,470	630	***10,500***
7%	1,308	229	98	***1,635***	25%	4,670	817	350	***5,838***
7%	35,000	6,125	2,625	***43,750***	25%	125,000	21,875	9,375	***156,250***
7%	1,904	333	143	***2,380***	25%	6,800	1,190	510	***8,500***
7%	26,600	4,655	1,995	***33,250***	25%	95,000	16,625	7,125	***118,750***
7%	1,285	225	96	***1,607***	25%	4,590	803	344	***5,738***
7%	4,915	860	369	***6,144***	25%	17,553	3,072	1,316	***21,941***
7%	132	23	10	***165***	25%	470	82	35	***588***
7%	39,760	6,958	2,982	***49,700***	25%	142,000	24,850	10,650	***177,500***
7%	952	167	71	***1,190***	25%	3,400	595	255	***4,250***
7%	6,888	1,205	517	***8,610***	25%	24,600	4,305	1,845	***30,750***
7%	448	78	34	***560***	25%	1,600	280	120	***2,000***
7%	3,640	637	273	***4,550***	25%	13,000	2,275	975	***16,250***
7%	64	11	5	***81***	25%	230	40	17	***288***
7%	21,000	3,675	1,575	***26,250***	25%	75,000	13,125	5,625	***93,750***
7%	2,520	441	189	***3,150***	25%	9,000	1,575	675	***11,250***
7%	1,120	196	84	***1,400***	25%	4,000	700	300	***5,000***
7%	308,000	53,900	23,100	***385,000***	25%	1,100,000	192,500	82,500	***1,375,000***
7%	3,640	637	273	***4,550***	25%	13,000	2,275	975	***16,250***
7%	4,805	841	360	***6,006***	25%	17,159	3,003	1,287	***21,449***
7%	7,207	1,261	541	***9,009***	25%	25,739	4,504	1,930	***32,174***
7%	1,204	211	90	***1,505***	25%	4,300	753	323	***5,375***
7%	4,200	735	315	***5,250***	25%	15,000	2,625	1,125	***18,750***
7%	8,680	1,519	651	***10,850***	25%	31,000	5,425	2,325	***38,750***
7%	1,335	234	100	***1,669***	25%	4,769	835	358	***5,961***
7%	1,456	255	109	***1,820***	25%	5,200	910	390	***6,500***
7%	26,600	4,655	1,995	***33,250***	25%	95,000	16,625	7,125	***118,750***
7%	1,220,868	213,652	91,565	***1,526,085***	25%	4,360,243	763,043	327,018	***5,450,304***
7%	42,000	7,350	3,150	***52,500***	25%	150,000	26,250	11,250	***187,500***
7%	143	25	11	***179***	25%	510	89	38	***638***
7%	672	118	50	***840***	25%	2,400	420	180	***3,000***
7%	5,535	969	415	***6,919***	25%	19,769	3,460	1,483	***24,711***
7%	5,460	956	410	***6,825***	25%	19,500	3,413	1,463	***24,375***
7%	9,240	1,617	693	***11,550***	25%	33,000	5,775	2,475	***41,250***
7%	2,979	521	223	***3,724***	25%	10,640	1,862	798	***13,300***
7%	7,683	1,345	576	***9,604***	25%	27,440	4,802	2,058	***34,300***
7%	0	0	0	***0***	25%	0	0	0	***0***
7%	13,300	2,328	998	***16,625***	25%	47,500	8,313	3,563	***59,375***
7%	29,181	5,107	2,189	***36,476***	25%	104,217	18,238	7,816	***130,271***
7%	26,600	4,655	1,995	***33,250***	25%	95,000	16,625	7,125	***118,750***
7%	3,762	658	282	***4,703***	25%	13,437	2,351	1,008	***16,796***
7%	90	16	7	***112***	25%	320	56	24	***400***
7%	384	67	29	***480***	25%	1,370	240	103	***1,713***
7%	10,920	1,911	819	***13,650***	25%	39,000	6,825	2,925	***48,750***
7%	733	128	55	***916***	25%	2,617	458	196	***3,271***
7%	868	152	65	***1,085***	25%	3,100	543	233	***3,875***
7%	182	32	14	***228***	25%	650	114	49	***813***
7%	2,548	446	191	***3,185***	25%	9,100	1,593	683	***11,375***
7%	8,400	1,470	630	***10,500***	25%	30,000	5,250	2,250	***37,500***
7%	7,560	1,323	567	***9,450***	25%	27,000	4,725	2,025	***33,750***
7%	4,442	777	333	***5,553***	25%	15,865	2,776	1,190	***19,831***
7%	448	78	34	***560***	25%	1,600	280	120	***2,000***
7%	5,600	980	420	***7,000***	25%	20,000	3,500	1,500	***25,000***
7%	1,540	270	116	***1,925***	25%	5,500	963	413	***6,875***
7%	5,236	916	393	***6,545***	25%	18,700	3,273	1,403	***23,375***
7%	120,400	21,070	9,030	***150,500***	25%	430,000	75,250	32,250	***537,500***
7%	349,839	61,222	26,238	***437,299***	25%	1,249,426	218,650	93,707	***1,561,783***
7%	78,400	13,720	5,880	***98,000***	25%	280,000	49,000	21,000	***350,000***
7%	9,240	1,617	693	***11,550***	25%	33,000	5,775	2,475	***41,250***
7%	3,500	613	263	***4,375***	25%	12,500	2,188	938	***15,625***
7%	7,000	1,225	525	***8,750***	25%	25,000	4,375	1,875	***31,250***
7%	7,140	1,250	536	***8,925***	25%	25,500	4,463	1,913	***31,875***
7%	8,024	1,404	602	***10,030***	25%	28,657	5,015	2,149	***35,821***
7%	5,880	1,029	441	***7,350***	25%	21,000	3,675	1,575	***26,250***
7%	30,800	5,390	2,310	***38,500***	25%	110,000	19,250	8,250	***137,500***
7%	9,100	1,593	683	***11,375***	25%	32,500	5,688	2,438	***40,625***
7%	1,154	202	87	***1,442***	25%	4,121	721	309	***5,151***
7%	5,544	970	416	***6,930***	25%	19,800	3,465	1,485	***24,750***
7%	9,800	1,715	735	***12,250***	25%	35,000	6,125	2,625	***43,750***
7%	504	88	38	***630***	25%	1,800	315	135	***2,250***

7%	7,000	1,225	525	***8,750***	25%	25,000	4,375	1,875	***31,250***
7%	6,720	1,176	504	***8,400***	25%	24,000	4,200	1,800	***30,000***
7%	4,256	745	319	***5,320***	25%	15,200	2,660	1,140	***19,000***
7%	51,800	9,065	3,885	***64,750***	25%	185,000	32,375	13,875	***231,250***
7%	8,680	1,519	651	***10,850***	25%	31,000	5,425	2,325	***38,750***
7%	1,176	206	88	***1,470***	25%	4,200	735	315	***5,250***
7%	2,744	480	206	***3,430***	25%	9,800	1,715	735	***12,250***
7%	119,000	20,825	8,925	***148,750***	25%	425,000	74,375	31,875	***531,250***
7%	4,884	855	366	***6,105***	25%	17,442	3,052	1,308	***21,803***
7%	8	1	1	***11***	25%	30	5	2	***38***
7%	38,360	6,713	2,877	***47,950***	25%	137,000	23,975	10,275	***171,250***
7%	7,840	1,372	588	***9,800***	25%	28,000	4,900	2,100	***35,000***
7%	22,960	4,018	1,722	***28,700***	25%	82,000	14,350	6,150	***102,500***
7%	980	172	74	***1,225***	25%	3,500	613	263	***4,375***
7%	6,381	1,117	479	***7,977***	25%	22,790	3,988	1,709	***28,488***
7%	168	29	13	***210***	25%	600	105	45	***750***
7%	5,040	882	378	***6,300***	25%	18,000	3,150	1,350	***22,500***
7%	7,000	1,225	525	***8,750***	25%	25,000	4,375	1,875	***31,250***
7%	42,196	7,384	3,165	***52,745***	25%	150,700	26,373	11,303	***188,375***
7%	1,176	206	88	***1,470***	25%	4,200	735	315	***5,250***
7%	46,480	8,134	3,486	***58,100***	25%	166,000	29,050	12,450	***207,500***
7%	3,920	686	294	***4,900***	25%	14,000	2,450	1,050	***17,500***
7%	4,760	833	357	***5,950***	25%	17,000	2,975	1,275	***21,250***
7%	27,791	4,863	2,084	***34,739***	25%	99,255	17,370	7,444	***124,069***
7%	38,080	6,664	2,856	***47,600***	25%	136,001	23,800	10,200	***170,001***
7%	1,260	221	95	***1,575***	25%	4,500	788	338	***5,625***
7%	24,364	4,264	1,827	***30,455***	25%	87,014	15,227	6,526	***108,768***
7%	92,038	16,107	6,903	***115,047***	25%	328,707	57,524	24,653	***410,884***
7%	560	98	42	***700***	25%	2,000	350	150	***2,500***
7%	81	14	6	***102***	25%	290	51	22	***363***
7%	39,480	6,909	2,961	***49,350***	25%	141,000	24,675	10,575	***176,250***
7%	7,549	1,321	566	***9,436***	25%	26,959	4,718	2,022	***33,699***
7%	4,262	746	320	***5,327***	25%	15,221	2,664	1,142	***19,026***
7%	2,100	368	158	***2,625***	25%	7,500	1,313	563	***9,375***
7%	560	98	42	***700***	25%	2,000	350	150	***2,500***
7%	952	167	71	***1,190***	25%	3,400	595	255	***4,250***
7%	33,880	5,929	2,541	***42,350***	25%	121,000	21,175	9,075	***151,250***
7%	3,258	570	244	***4,073***	25%	11,636	2,036	873	***14,545***
7%	10,360	1,813	777	***12,950***	25%	37,000	6,475	2,775	***46,250***
7%	1,064	186	80	***1,330***	25%	3,800	665	285	***4,750***
7%	896	157	67	***1,120***	25%	3,200	560	240	***4,000***
7%	6,663	1,166	500	***8,328***	25%	23,795	4,164	1,785	***29,744***
7%	0	0	0	***0***	25%	0	0	0	***0***
7%	643	113	48	***804***	25%	2,296	402	172	***2,870***
7%	8,400	1,470	630	***10,500***	25%	30,000	5,250	2,250	***37,500***
7%	72,800	12,740	5,460	***91,000***	25%	260,000	45,500	19,500	***325,000***
7%	2,520	441	189	***3,150***	25%	9,000	1,575	675	***11,250***
7%	7,896	1,382	592	***9,870***	25%	28,200	4,935	2,115	***35,250***
7%	17,920	3,136	1,344	***22,400***	25%	64,000	11,200	4,800	***80,000***
7%	83,125	14,547	6,234	***103,907***	25%	296,876	51,953	22,266	***371,095***
7%	1,960	343	147	***2,450***	25%	7,000	1,225	525	***8,750***
7%	9,128	1,597	685	***11,410***	25%	32,600	5,705	2,445	***40,750***
7%	36,953	6,467	2,771	***46,192***	25%	131,976	23,096	9,898	***164,970***
7%	4,200	735	315	***5,250***	25%	15,000	2,625	1,125	***18,750***
7%	3,920	686	294	***4,900***	25%	14,000	2,450	1,050	***17,500***
7%	5,751	1,006	431	***7,189***	25%	20,540	3,595	1,541	***25,675***
7%	95	17	7	***119***	25%	340	60	26	***425***
7%	30,800	5,390	2,310	***38,500***	25%	110,000	19,250	8,250	***137,500***
7%	43,102	7,543	3,233	***53,878***	25%	153,937	26,939	11,545	***192,421***
7%	10,360	1,813	777	***12,950***	25%	37,000	6,475	2,775	***46,250***
7%	8,400	1,470	630	***10,500***	25%	30,000	5,250	2,250	***37,500***
7%	6,440	1,127	483	***8,050***	25%	23,000	4,025	1,725	***28,750***
	3,622,855	**634,000**	**271,714**	***4,528,568***		**12,938,767**	**2,264,284**	**970,408**	***16,173,459***

Disease: HPAI			**in '000 US$**					**in '000 US$**			
			Baseline					**Impact: scenario 1 (most likely)**			
	Poultry stock ('000 head)	**Poultry stock losses (%)**	**Poultry value losses**	**Culling/ Disposal costs**	**Control costs**	***Total impact***	**Poultry stock losses (%)**	**Poultry value losses**	**Culling/ Disposal costs**	**Control costs**	***Total impact***
	2005	*2004-05 avg*	*2004-05 avg*	*2004-05 avg*	*2004-05 avg*	*2004-05 avg*					
case study 1 (Asia)	243,000	13.50%	84,103	8,200	6,308	***98,610***	15%	91,125	10,935	7,290	***109,350***
avg cost per head			*2.56*	*0.25*	*0.19*			*2.5*	*0.3*	*0.2*	
	2006 est.	*2006 est.*	*2006 est.*	*2006 est.*	*2006 est.*	*2006 est.*					
case study 2 (Africa)	140,000	2%	14,505	2,640	1,015	***18,161***	15%	126,000	21,000	8,400	***155,400***
avg cost per head			*5.49*	*1.00*	*0.38*			*6*	*1*	*0.4*	
Direct production costs/losses: Global impact, annual (i)											
avg cost per head								*4*	*0.7*	*0.3*	
scenario A (ii)							15%	***4,271,540***	***747,519***	***320,365***	***5,339,425***
scenario B (iii)							15%	***4,898,934***	***857,313***	***367,420***	***6,123,668***
scenario C (iv)							15%	***7,763,260***	***1,358,571***	***582,245***	***9,704,075***
Direct production costs/losses: Global impact, total (i)											
scenario A (ii)								***8,543,080***	***1,495,039***	***640,731***	***10,678,850***
scenario B (iii)								***9,797,868***	***1,714,627***	***734,840***	***12,247,335***
scenario C (iv)								***15,526,520***	***2,717,141***	***1,164,489***	***19,408,151***
Consequential on-farm losses: Global impact, annual (i)											
avg income loss per head											*6*
scenario A (ii)							15%				***6,407,310***
scenario B (iii)							15%				***7,348,401***
scenario C (iv)							15%				***11,644,890***
Consequential on-farm losses: Global impact, total (i)											
scenario A (ii)											***12,814,619***
scenario B (iii)											***14,696,802***
scenario C (iv)											***23,289,781***
Total direct impact including consequential on-farm losses, annual (i)											
scenario A (ii)											***11,746,734***
scenario B (iii)											***13,472,069***
scenario C (iv)											***21,348,966***
Total direct impact including consequential on-farm losses, total (i)											
scenario A (ii)											***23,493,469***
scenario B (iii)											***26,944,137***
scenario C (iv)											***42,697,931***

	Individual countries:									**in '000 US$**			
					Total poultry stock , 2005 (v)				**Impact: scenario 1 (most likely)**				
			Poultry stock ('000 head) (v)		*Scenario A countries*	*Scenario B countries*	*Scenario C countries*		**Poultry stock losses (%)**	**Poultry value losses**	**Culling/ Disposal costs**	**Control costs**	***Total impact***
				('000 head)	*7,119,233*	*8,164,890*	*12,938,767*						
		LDC State		*(% of total)*	*55.0%*	*63.1%*	*100.0%*						
1	Afghanistan	LDC	8,400		***5040***	***882***	***378***	***6300***	15%	5,040	882	378	***6,300***
2	Albania		4,670						15%	2,802	490	210	***3,503***
3	Algeria		125,000						15%	75,000	13,125	5,625	***93,750***
4	Angola	LDC	6,800		***4080***	***714***	***306***	***5100***	15%	4,080	714	306	***5,100***
5	**Argentina**		95,000						15%	57,000	9,975	4,275	***71,250***
6	Armenia		4,590						15%	2,754	482	207	***3,443***
7	Azerbaijan		17,553						15%	10,532	1,843	790	***13,165***
8	Bahrain		470						15%	282	49	21	***353***
9	Bangladesh	LDC	142,000		***85200***	***14910***	***6390***	***106500***	15%	85,200	14,910	6,390	***106,500***
10	Barbados		3,400						15%	2,040	357	153	***2,550***
11	Belarus		24,600						15%	14,760	2,583	1,107	***18,450***
12	Belize		1,600						15%	960	168	72	***1,200***
13	Benin	LDC	13,000		***7800***	***1365***	***585***	***9750***	15%	7,800	1,365	585	***9,750***
14	Bhutan	LDC	230		***138***	***24.15***	***10.35***	***172.5***	15%	138	24	10	***173***
15	Bolivia		75,000						15%	45,000	7,875	3,375	***56,250***
16	Bosnia-Herz		9,000						15%	5,400	945	405	***6,750***
17	Botswana		4,000						15%	2,400	420	180	***3,000***
18	Brazil		1,100,000						15%	660,000	115,500	49,500	***825,000***
19	Brunei		13,000						15%	7,800	1,365	585	***9,750***
20	Bulgaria		17,159						15%	10,295	1,802	772	***12,869***
21	Burkina Faso	LDC	25,739		***15443.4***	***2702.595***	***1158.255***	***19304.25***	15%	15,443	2,703	1,158	***19,304***
22	Burundi	LDC	4,300		***2580***	***451.5***	***193.5***	***3225***	15%	2,580	452	194	***3,225***
23	Cambodia	LDC	15,000		***9000***	***1575***	***675***	***11250***	15%	9,000	1,575	675	***11,250***
24	Cameroon		31,000						15%	18,600	3,255	1,395	***23,250***
25	Central Afr. Rep.	LDC	4,769		***2861.4***	***500.745***	***214.605***	***3576.75***	15%	2,861	501	215	***3,577***
26	Chad	LDC	5,200		***3120***	***546***	***234***	***3900***	15%	3,120	546	234	***3,900***
27	Chile		95,000						15%	57,000	9,975	4,275	***71,250***
28	China		4,360,243						15%	2,616,146	457,826	196,211	***3,270,182***
29	Colombia		150,000						15%	90,000	15,750	6,750	***112,500***
30	Comoros	LDC	510		***306***	***53.55***	***22.95***	***382.5***	15%	306	54	23	***383***
31	Congo		2,400						15%	1,440	252	108	***1,800***
32	Congo Dem. Rep	LDC	19,769		***11861.4***	***2075.745***	***889.605***	***14826.75***	15%	11,861	2,076	890	***14,827***
33	Costa Rica		19,500						15%	11,700	2,048	878	***14,625***
34	Cote d'Ivoire		33,000						15%	19,800	3,465	1,485	***24,750***
35	Croatia		10,640						15%	6,384	1,117	479	***7,980***
36	Cuba		27,440						15%	16,464	2,881	1,235	***20,580***
37	Djibouti	LDC			***0***	***0***	***0***	***0***	15%	0	0	0	***0***
38	Dominican Rep		47,500						15%	28,500	4,988	2,138	***35,625***
39	Ecuador		104,217						15%	62,530	10,943	4,690	***78,163***
40	Egypt		95,000						15%	57,000	9,975	4,275	***71,250***
41	El Salvador		13,437						15%	8,062	1,411	605	***10,078***
42	Eq. Guinea		320						15%	192	34	14	***240***
43	Eritrea	LDC	1,370		***822***	***143.85***	***61.65***	***1027.5***	15%	822	144	62	***1,028***
44	Ethiopia	LDC	39,000		***23400***	***4095***	***1755***	***29250***	15%	23,400	4,095	1,755	***29,250***
45	FYR Macedonia		2,617						15%	1,570	275	118	***1,963***
46	Gabon		3,100						15%	1,860	326	140	***2,325***
47	Gambia	LDC	650		***390***	***68.25***	***29.25***	***487.5***	15%	390	68	29	***488***
48	Georgia		9,100						15%	5,460	956	410	***6,825***
49	Ghana		30,000						15%	18,000	3,150	1,350	***22,500***
50	Guatemala		27,000						15%	16,200	2,835	1,215	***20,250***
51	Guinea	LDC	15,865		***9519***	***1665.825***	***713.925***	***11898.75***	15%	9,519	1,666	714	***11,899***
52	Guinea Bissau	LDC	1,600		***960***	***168***	***72***	***1200***	15%	960	168	72	***1,200***
53	Guyana		20,000						15%	12,000	2,100	900	***15,000***
54	Haiti	LDC	5,500		***3300***	***577.5***	***247.5***	***4125***	15%	3,300	578	248	***4,125***
55	Honduras		18,700						15%	11,220	1,964	842	***14,025***
56	India		430,000						15%	258,000	45,150	19,350	***322,500***
57	Indonesia		1,249,426						15%	749,656	131,190	56,224	***937,070***
58	Iran		280,000						15%	168,000	29,400	12,600	***210,000***
59	Iraq		33,000						15%	19,800	3,465	1,485	***24,750***
60	Jamaica		12,500						15%	7,500	1,313	563	***9,375***
61	Jordan		25,000						15%	15,000	2,625	1,125	***18,750***
62	Kazakhstan		25,500						15%	15,300	2,678	1,148	***19,125***
63	Kenya		28,657						15%	17,194	3,009	1,290	***21,493***
64	Korea North		21,000						15%	12,600	2,205	945	***15,750***
65	Korea South		110,000						15%	66,000	11,550	4,950	***82,500***
66	Kuwait		32,500						15%	19,500	3,413	1,463	***24,375***
67	Kyrgyzstan		4,121						15%	2,473	433	185	***3,091***
68	Laos	LDC	19,800		***11880***	***2079***	***891***	***14850***	15%	11,880	2,079	891	***14,850***
69	Lebanon		35,000						15%	21,000	3,675	1,575	***26,250***
70	Lesotho	LDC	1,800		***1080***	***189***	***81***	***1350***	15%	1,080	189	81	***1,350***
71	Libya		25,000						15%	15,000	2,625	1,125	***18,750***
72	Madagascar	LDC	24,000		***14400***	***2520***	***1080***	***18000***	15%	14,400	2,520	1,080	***18,000***
73	Malawi	LDC	15,200		***9120***	***1596***	***684***	***11400***	15%	9,120	1,596	684	***11,400***

74	Malaysia		185,000						15%	111,000	19,425	8,325	***138,750***
75	Mali	LDC	31,000		***18600***	***3255***	***1395***	***23250***	15%	18,600	3,255	1,395	***23,250***
76	Mauritania	LDC	4,200		***2520***	***441***	***189***	***3150***	15%	2,520	441	189	***3,150***
77	Mauritius		9,800						15%	5,880	1,029	441	***7,350***
78	Mexico		425,000						15%	255,000	44,625	19,125	***318,750***
79	Moldova		17,442						15%	10,465	1,831	785	***13,082***
80	Mongolia		30						15%	18	3	1	***23***
81	Morocco		137,000						15%	82,200	14,385	6,165	***102,750***
82	Mozambique	LDC	28,000		***16800***	***2940***	***1260***	***21000***	15%	16,800	2,940	1,260	***21,000***
83	Myanmar	LDC	82,000		***49200***	***8610***	***3690***	***61500***	15%	49,200	8,610	3,690	***61,500***
84	Namibia		3,500						15%	2,100	368	158	***2,625***
85	Nepal	LDC	22,790		***13674***	***2392.95***	***1025.55***	***17092.5***	15%	13,674	2,393	1,026	***17,093***
86	New Caledonia		600						15%	360	63	27	***450***
87	Nicaragua		18,000						15%	10,800	1,890	810	***13,500***
88	Niger	LDC	25,000		***15000***	***2625***	***1125***	***18750***	15%	15,000	2,625	1,125	***18,750***
89	**Nigeria**		150,700						15%	90,420	15,824	6,782	***113,025***
90	Oman		4,200						15%	2,520	441	189	***3,150***
91	Pakistan		166,000						15%	99,600	17,430	7,470	***124,500***
92	Panama		14,000						15%	8,400	1,470	630	***10,500***
93	Paraguay		17,000						15%	10,200	1,785	765	***12,750***
94	Peru		99,255						15%	59,553	10,422	4,466	***74,441***
95	Philippines		136,001						15%	81,601	14,280	6,120	***102,001***
96	Qatar		4,500						15%	2,700	473	203	***3,375***
97	**Romania**		87,014						15%	52,208	9,136	3,916	***65,261***
98	Russia		328,707						15%	197,224	34,514	14,792	***246,530***
99	Rwanda	LDC	2,000		***1200***	***210***	***90***	***1500***	15%	1,200	210	90	***1,500***
100	Sao Tome	LDC	290		***174***	***30.45***	***13.05***	***217.5***	15%	174	30	13	***218***
101	Saudi Arabia		141,000						15%	84,600	14,805	6,345	***105,750***
102	Senegal	LDC	26,959		***16175.4***	***2830.695***	***1213.155***	***20219.25***	15%	16,175	2,831	1,213	***20,219***
103	Serbia-Mont		15,221						15%	9,133	1,598	685	***11,416***
104	Sierra Leone	LDC	7,500		***4500***	***787.5***	***337.5***	***5625***	15%	4,500	788	338	***5,625***
105	Singapore		2,000						15%	1,200	210	90	***1,500***
106	Somalia	LDC	3,400		***2040***	***357***	***153***	***2550***	15%	2,040	357	153	***2,550***
107	South Africa		121,000						15%	72,600	12,705	5,445	***90,750***
108	Sri Lanka		11,636						15%	6,982	1,222	524	***8,727***
109	Sudan	LDC	37,000		***22200***	***3885***	***1665***	***27750***	15%	22,200	3,885	1,665	***27,750***
110	Suriname		3,800						15%	2,280	399	171	***2,850***
111	Swaziland		3,200						15%	1,920	336	144	***2,400***
112	Syria		23,795						15%	14,277	2,498	1,071	***17,846***
113	Taipei China (Taiwan)								15%	0	0	0	***0***
114	Tajikistan		2,296						15%	1,378	241	103	***1,722***
115	Tanzania	LDC	30,000		***18000***	***3150***	***1350***	***22500***	15%	18,000	3,150	1,350	***22,500***
116	Thailand		260,000						15%	156,000	27,300	11,700	***195,000***
117	Togo	LDC	9,000		***5400***	***945***	***405***	***6750***	15%	5,400	945	405	***6,750***
118	Trinidad-Tobago		28,200						15%	16,920	2,961	1,269	***21,150***
119	Tunisia		64,000						15%	38,400	6,720	2,880	***48,000***
120	Turkey		296,876						15%	178,126	31,172	13,359	***222,657***
121	Turkmenistan		7,000						15%	4,200	735	315	***5,250***
122	Uganda	LDC	32,600		***19560***	***3423***	***1467***	***24450***	15%	19,560	3,423	1,467	***24,450***
123	Ukraine		131,976						15%	79,186	13,857	5,939	***98,982***
124	UAE		15,000						15%	9,000	1,575	675	***11,250***
125	Uruguay		14,000						15%	8,400	1,470	630	***10,500***
126	Uzbekistan		20,540						15%	12,324	2,157	924	***15,405***
127	Vanuatu	LDC	340		***204***	***35.7***	***15.3***	***255***	15%	204	36	15	***255***
128	Venezuela		110,000						15%	66,000	11,550	4,950	***82,500***
129	**Vietnam**		153,937						15%	92,362	16,163	6,927	***115,453***
130	Yemen	LDC	37,000		***22200***	***3885***	***1665***	***27750***	15%	22,200	3,885	1,665	***27,750***
131	Zambia	LDC	30,000		***18000***	***3150***	***1350***	***22500***	15%	18,000	3,150	1,350	***22,500***
132	Zimbabwe		23,000						15%	13,800	2,415	1,035	***17,250***
				Annual impact on LDCs	**Poultry value losses for LDCs**	**Culling/ Disposal costs for LDCs**	**Control costs for LDCs**	***Total impact for LDCs***					
	TOTAL		**12,938,767**	**scenario A**	**58,080**	**10,164**	**4,356**	**72,600**		**7,763,260**	**1,358,571**	**582,245**	***9,704,075***
				scenario B	**206,292**	**36,101**	**15,472**	**257,865**					
				scenario C	**467,749**	**81,856**	**35,081**	**584,686**					
				Total impact on LDCs									
				scenario A	**116,160**	**20,328**	**8,712**	**145,200**					
				scenario B	**412,584**	**72,202**	**30,944**	**515,730**					
Notes:				**scenario C**	**935,497**	**163,712**	**70,162**	**1,169,372**					

(i) The 'global' impact is given in a range, depending on 3 scenarios in terms of country coverage (scenarios A to C).

Furthermore, it is indicated per year and in total, depending on the assumptions for duration of the epidemic - see 'assumptions outbreak costs'

Includes animal value losses, culling/disposal and control costs

(ii) Scenario A Includes the following countries: Cambodia, China, Indonesia, Laos, Thailand, Vietnam, S. Korea; Mongolia, Kazakhstan, Russia, Turkey, Romania; Nigeria, Niger, Sudan

(iii) Scenario B includes the countries of Note (b) above plus : N korea, Malaysia, Brunei, Myanmar, Singapore, Philippines; Bangladesh, Bhutan, India, Nepal, Sri Lanka

(iv) Scenario C includes all OIE developing country members (132 countries in total)

(v) Latest data available, source FAOSTAT. Chicken numbers: since 2005 FAOSTAT does not differentiate any more between broilers and layers (double counting between the 2 categories was possible in earlier years).

	in '000 US$					in '000 US$			
Impact: scenario 2 (low impact)					Impact: scenario 3 (high impact)				
Poultry stock losses (%)	Poultry value losses	Culling/ Disposal costs	Control costs	*Total impact*	Poultry stock losses (%)	Poultry value losses	Culling/ Disposal costs	Control costs	*Total impact*
7%	42,525	5,103	3,402	***51,030***	25%	151,875	18,225	12,150	***182,250***
	2.5	*0.3*	*0.2*			*2.5*	*0.3*	*0.2*	
7%	58,800	9,800	3,920	***72,520***	25%	210,000	35,000	14,000	***259,000***
	6	*1*	*0.4*			*6*	*1*	*0.4*	
	4	*0.7*	*0.3*			*4*	*0.7*	*0.3*	
7%	***1,993,385***	***348,842***	***149,504***	***2,491,732***	25%	***7,119,233***	***1,245,866***	***533,942***	***8,899,041***
7%	***2,286,169***	***400,080***	***171,463***	***2,857,712***	25%	***8,164,890***	***1,428,856***	***612,367***	***10,206,113***
7%	***3,622,855***	***634,000***	***271,714***	***4,528,568***	25%	***12,938,767***	***2,264,284***	***970,408***	***16,173,459***
	1,993,385	***348,842***	***149,504***	***2,491,732***		***21,357,699***	***3,737,597***	***1,601,827***	***26,697,124***
	2,286,169	***400,080***	***171,463***	***2,857,712***		***24,494,670***	***4,286,567***	***1,837,100***	***30,618,338***
	3,622,855	***634,000***	***271,714***	***4,528,568***		***38,816,301***	***6,792,853***	***2,911,223***	***48,520,376***
				2					***12***
7%				***996,693***	25%				***21,357,699***
7%				***1,143,085***	25%				***24,494,670***
7%				***1,811,427***	25%				***38,816,301***
				996,693					***64,073,097***
				1,143,085					***73,484,010***
				1,811,427					***116,448,903***
				3,488,424					***30,256,740***
				4,000,796					***34,700,783***
				6,339,996					***54,989,760***
				3,488,424					***90,770,221***
				4,000,796					***104,102,348***
				6,339,996					***164,969,279***

	in '000 US$					in '000 US$			
Impact: scenario 2 (low impact)					Impact: scenario 3 (high impact)				
Poultry stock losses (%)	Poultry value losses	Culling/ Disposal costs	Control costs	*Total impact*	Poultry stock losses (%)	Poultry value losses	Culling/ Disposal costs	Control costs	*Total impact*
7%	2,352	412	176	***2,940***	25%	8,400	1,470	630	***10,500***
7%	1,308	229	98	***1,635***	25%	4,670	817	350	***5,838***
7%	35,000	6,125	2,625	***43,750***	25%	125,000	21,875	9,375	***156,250***
7%	1,904	333	143	***2,380***	25%	6,800	1,190	510	***8,500***
7%	26,600	4,655	1,995	***33,250***	25%	95,000	16,625	7,125	***118,750***
7%	1,285	225	96	***1,607***	25%	4,590	803	344	***5,738***
7%	4,915	860	369	***6,144***	25%	17,553	3,072	1,316	***21,941***
7%	132	23	10	***165***	25%	470	82	35	***588***
7%	39,760	6,958	2,982	***49,700***	25%	142,000	24,850	10,650	***177,500***
7%	952	167	71	***1,190***	25%	3,400	595	255	***4,250***
7%	6,888	1,205	517	***8,610***	25%	24,600	4,305	1,845	***30,750***
7%	448	78	34	***560***	25%	1,600	280	120	***2,000***
7%	3,640	637	273	***4,550***	25%	13,000	2,275	975	***16,250***
7%	64	11	5	***81***	25%	230	40	17	***288***
7%	21,000	3,675	1,575	***26,250***	25%	75,000	13,125	5,625	***93,750***
7%	2,520	441	189	***3,150***	25%	9,000	1,575	675	***11,250***
7%	1,120	196	84	***1,400***	25%	4,000	700	300	***5,000***
7%	308,000	53,900	23,100	***385,000***	25%	1,100,000	192,500	82,500	***1,375,000***
7%	3,640	637	273	***4,550***	25%	13,000	2,275	975	***16,250***
7%	4,805	841	360	***6,006***	25%	17,159	3,003	1,287	***21,449***
7%	7,207	1,261	541	***9,009***	25%	25,739	4,504	1,930	***32,174***
7%	1,204	211	90	***1,505***	25%	4,300	753	323	***5,375***
7%	4,200	735	315	***5,250***	25%	15,000	2,625	1,125	***18,750***
7%	8,680	1,519	651	***10,850***	25%	31,000	5,425	2,325	***38,750***
7%	1,335	234	100	***1,669***	25%	4,769	835	358	***5,961***
7%	1,456	255	109	***1,820***	25%	5,200	910	390	***6,500***
7%	26,600	4,655	1,995	***33,250***	25%	95,000	16,625	7,125	***118,750***
7%	1,220,868	213,652	91,565	***1,526,085***	25%	4,360,243	763,043	327,018	***5,450,304***
7%	42,000	7,350	3,150	***52,500***	25%	150,000	26,250	11,250	***187,500***
7%	143	25	11	***179***	25%	510	89	38	***638***
7%	672	118	50	***840***	25%	2,400	420	180	***3,000***
7%	5,535	969	415	***6,919***	25%	19,769	3,460	1,483	***24,711***
7%	5,460	956	410	***6,825***	25%	19,500	3,413	1,463	***24,375***
7%	9,240	1,617	693	***11,550***	25%	33,000	5,775	2,475	***41,250***
7%	2,979	521	223	***3,724***	25%	10,640	1,862	798	***13,300***
7%	7,683	1,345	576	***9,604***	25%	27,440	4,802	2,058	***34,300***
7%	0	0	0	***0***	25%	0	0	0	***0***
7%	13,300	2,328	998	***16,625***	25%	47,500	8,313	3,563	***59,375***
7%	29,181	5,107	2,189	***36,476***	25%	104,217	18,238	7,816	***130,271***
7%	26,600	4,655	1,995	***33,250***	25%	95,000	16,625	7,125	***118,750***
7%	3,762	658	282	***4,703***	25%	13,437	2,351	1,008	***16,796***
7%	90	16	7	***112***	25%	320	56	24	***400***
7%	384	67	29	***480***	25%	1,370	240	103	***1,713***
7%	10,920	1,911	819	***13,650***	25%	39,000	6,825	2,925	***48,750***
7%	733	128	55	***916***	25%	2,617	458	196	***3,271***
7%	868	152	65	***1,085***	25%	3,100	543	233	***3,875***
7%	182	32	14	***228***	25%	650	114	49	***813***
7%	2,548	446	191	***3,185***	25%	9,100	1,593	683	***11,375***
7%	8,400	1,470	630	***10,500***	25%	30,000	5,250	2,250	***37,500***
7%	7,560	1,323	567	***9,450***	25%	27,000	4,725	2,025	***33,750***
7%	4,442	777	333	***5,553***	25%	15,865	2,776	1,190	***19,831***
7%	448	78	34	***560***	25%	1,600	280	120	***2,000***
7%	5,600	980	420	***7,000***	25%	20,000	3,500	1,500	***25,000***
7%	1,540	270	116	***1,925***	25%	5,500	963	413	***6,875***
7%	5,236	916	393	***6,545***	25%	18,700	3,273	1,403	***23,375***
7%	120,400	21,070	9,030	***150,500***	25%	430,000	75,250	32,250	***537,500***
7%	349,839	61,222	26,238	***437,299***	25%	1,249,426	218,650	93,707	***1,561,783***
7%	78,400	13,720	5,880	***98,000***	25%	280,000	49,000	21,000	***350,000***
7%	9,240	1,617	693	***11,550***	25%	33,000	5,775	2,475	***41,250***
7%	3,500	613	263	***4,375***	25%	12,500	2,188	938	***15,625***
7%	7,000	1,225	525	***8,750***	25%	25,000	4,375	1,875	***31,250***
7%	7,140	1,250	536	***8,925***	25%	25,500	4,463	1,913	***31,875***
7%	8,024	1,404	602	***10,030***	25%	28,657	5,015	2,149	***35,821***
7%	5,880	1,029	441	***7,350***	25%	21,000	3,675	1,575	***26,250***
7%	30,800	5,390	2,310	***38,500***	25%	110,000	19,250	8,250	***137,500***
7%	9,100	1,593	683	***11,375***	25%	32,500	5,688	2,438	***40,625***
7%	1,154	202	87	***1,442***	25%	4,121	721	309	***5,151***
7%	5,544	970	416	***6,930***	25%	19,800	3,465	1,485	***24,750***
7%	9,800	1,715	735	***12,250***	25%	35,000	6,125	2,625	***43,750***
7%	504	88	38	***630***	25%	1,800	315	135	***2,250***
7%	7,000	1,225	525	***8,750***	25%	25,000	4,375	1,875	***31,250***
7%	6,720	1,176	504	***8,400***	25%	24,000	4,200	1,800	***30,000***
7%	4,256	745	319	***5,320***	25%	15,200	2,660	1,140	***19,000***

7%	51,800	9,065	3,885	***64,750***	25%	185,000	32,375	13,875	***231,250***
7%	8,680	1,519	651	***10,850***	25%	31,000	5,425	2,325	***38,750***
7%	1,176	206	88	***1,470***	25%	4,200	735	315	***5,250***
7%	2,744	480	206	***3,430***	25%	9,800	1,715	735	***12,250***
7%	119,000	20,825	8,925	***148,750***	25%	425,000	74,375	31,875	***531,250***
7%	4,884	855	366	***6,105***	25%	17,442	3,052	1,308	***21,803***
7%	8	1	1	***11***	25%	30	5	2	***38***
7%	38,360	6,713	2,877	***47,950***	25%	137,000	23,975	10,275	***171,250***
7%	7,840	1,372	588	***9,800***	25%	28,000	4,900	2,100	***35,000***
7%	22,960	4,018	1,722	***28,700***	25%	82,000	14,350	6,150	***102,500***
7%	980	172	74	***1,225***	25%	3,500	613	263	***4,375***
7%	6,381	1,117	479	***7,977***	25%	22,790	3,988	1,709	***28,488***
7%	168	29	13	***210***	25%	600	105	45	***750***
7%	5,040	882	378	***6,300***	25%	18,000	3,150	1,350	***22,500***
7%	7,000	1,225	525	***8,750***	25%	25,000	4,375	1,875	***31,250***
7%	42,196	7,384	3,165	***52,745***	25%	150,700	26,373	11,303	***188,375***
7%	1,176	206	88	***1,470***	25%	4,200	735	315	***5,250***
7%	46,480	8,134	3,486	***58,100***	25%	166,000	29,050	12,450	***207,500***
7%	3,920	686	294	***4,900***	25%	14,000	2,450	1,050	***17,500***
7%	4,760	833	357	***5,950***	25%	17,000	2,975	1,275	***21,250***
7%	27,791	4,863	2,084	***34,739***	25%	99,255	17,370	7,444	***124,069***
7%	38,080	6,664	2,856	***47,600***	25%	136,001	23,800	10,200	***170,001***
7%	1,260	221	95	***1,575***	25%	4,500	788	338	***5,625***
7%	24,364	4,264	1,827	***30,455***	25%	87,014	15,227	6,526	***108,768***
7%	92,038	16,107	6,903	***115,047***	25%	328,707	57,524	24,653	***410,884***
7%	560	98	42	***700***	25%	2,000	350	150	***2,500***
7%	81	14	6	***102***	25%	290	51	22	***363***
7%	39,480	6,909	2,961	***49,350***	25%	141,000	24,675	10,575	***176,250***
7%	7,549	1,321	566	***9,436***	25%	26,959	4,718	2,022	***33,699***
7%	4,262	746	320	***5,327***	25%	15,221	2,664	1,142	***19,026***
7%	2,100	368	158	***2,625***	25%	7,500	1,313	563	***9,375***
7%	560	98	42	***700***	25%	2,000	350	150	***2,500***
7%	952	167	71	***1,190***	25%	3,400	595	255	***4,250***
7%	33,880	5,929	2,541	***42,350***	25%	121,000	21,175	9,075	***151,250***
7%	3,258	570	244	***4,073***	25%	11,636	2,036	873	***14,545***
7%	10,360	1,813	777	***12,950***	25%	37,000	6,475	2,775	***46,250***
7%	1,064	186	80	***1,330***	25%	3,800	665	285	***4,750***
7%	896	157	67	***1,120***	25%	3,200	560	240	***4,000***
7%	6,663	1,166	500	***8,328***	25%	23,795	4,164	1,785	***29,744***
7%	0	0	0	***0***	25%	0	0	0	***0***
7%	643	113	48	***804***	25%	2,296	402	172	***2,870***
7%	8,400	1,470	630	***10,500***	25%	30,000	5,250	2,250	***37,500***
7%	72,800	12,740	5,460	***91,000***	25%	260,000	45,500	19,500	***325,000***
7%	2,520	441	189	***3,150***	25%	9,000	1,575	675	***11,250***
7%	7,896	1,382	592	***9,870***	25%	28,200	4,935	2,115	***35,250***
7%	17,920	3,136	1,344	***22,400***	25%	64,000	11,200	4,800	***80,000***
7%	83,125	14,547	6,234	***103,907***	25%	296,876	51,953	22,266	***371,095***
7%	1,960	343	147	***2,450***	25%	7,000	1,225	525	***8,750***
7%	9,128	1,597	685	***11,410***	25%	32,600	5,705	2,445	***40,750***
7%	36,953	6,467	2,771	***46,192***	25%	131,976	23,096	9,898	***164,970***
7%	4,200	735	315	***5,250***	25%	15,000	2,625	1,125	***18,750***
7%	3,920	686	294	***4,900***	25%	14,000	2,450	1,050	***17,500***
7%	5,751	1,006	431	***7,189***	25%	20,540	3,595	1,541	***25,675***
7%	95	17	7	***119***	25%	340	60	26	***425***
7%	30,800	5,390	2,310	***38,500***	25%	110,000	19,250	8,250	***137,500***
7%	43,102	7,543	3,233	***53,878***	25%	153,937	26,939	11,545	***192,421***
7%	10,360	1,813	777	***12,950***	25%	37,000	6,475	2,775	***46,250***
7%	8,400	1,470	630	***10,500***	25%	30,000	5,250	2,250	***37,500***
7%	6,440	1,127	483	***8,050***	25%	23,000	4,025	1,725	***28,750***
	3,622,855	**634,000**	**271,714**	***4,528,568***		**12,938,767**	**2,264,284**	**970,408**	***16,173,459***

Disease: HPAI						**in '000 US$**			
	Baseline				**Impact: scenario 1 (most likely)**				
	Poultry stock ('000 head)	**GDP ('000 US$)**	**Trade volume (tonnes)**	**Tourism/travel value ('000 US$)**	**Ripple: domestic market (a)**	**Ripple: export markets (b)**	**Spill-over: tourism (c)**	**Wider society (d)**	***Total impact***
	2005	*2004-05 avg*	*2003-04 avg.*	*2004 est.*					
	12,938,767	44,450,000,000	8,630,000	1,500,000,000					
Indirect costs/losses: Global impact, annual (i)									
					5,279,017	3,774,984	72,000,000	311,150,000	***392,204,001***
								711,200,000	***792,254,001***
Indirect costs/losses: Global impact, total (i)									
					10,558,034	7,549,968	144,000,000	622,300,000	***784,408,002***
								1,422,400,000	***1,584,508,002***

Notes:

(a) Domestic sales loss = loss in monthly sales volume (% of poultry stock affected by crisis x lower price) + loss in monthly sales value (% of poultry stock not affected by crisis x price drop) x duration (months):

	Ripple (domestic market): detailed calculations
poultry sold in dometic markets ('000 head):	2,587,753
poultry sales loss ('000 head):	517,551
poultry sales loss (volume loss x lower price) ('000 US$):	931,591
rest of poultry sold in domestic markets ('000 head):	2,070,203
poultry sales loss (lower volume x price drop) ('000 US$)	828,081
Total poultry sales loss (monthly, '000 US$):	1,759,672
Total poultry sales loss ('000 US$):	5,279,017

(b) Exports loss = loss in monthly exports volume (% of exports affected by crisis x lower price) + loss in monthly sales value (% of exports not affected by crisis x price drop) x duration (months) :

	Ripple (export markets): detailed calculations
poultry exports (tonnes):	8,630,000
poultry exports loss (tonnes):	43,150
poultry exports loss (volume loss x lower price) ('000 US$):	52,319
rest of poultry exports (tonnes):	8,586,850
poultry sales loss (lower volume x price drop) ('000 US$)	104,973
Total poultry sales loss (monthly, '000 US$):	157,291
Total poultry sales loss ('000 US$):	3,774,984

(c) tourism value loss x duration (months)

(d) low value assumes 15% attack rate; high value assumes 35% attack rate

(i) Indicated per year and in total, depending on the assumptions for duration of the epidemic - see 'assumptions outbreak costs'

FOR ASSUMPTIONS SEE WORKSHEET 'Assumptions outbreak costs'

in '000 US$					in '000 US$				
Impact: scenario 2 (low impact)					Impact: scenario 3 (high impact)				
Ripple: domestic market (a)	**Ripple: export markets (b)**	**Spill-over: tourism (c)**	**Wider society (d)**	***Total impact***	**Ripple: domestic market (a)**	**Ripple: export markets (b)**	**Spill-over: tourism (c)**	**Wider society (d)**	***Total impact***
957,469	883,898	18,000,000	177,800,000	***197,641,367***	17,389,703	11,255,904	360,000,000	444,500,000	***833,145,607***
			711,200,000	***731,041,367***				1,333,500,000	***1,722,145,607***
957,469	883,898	18,000,000	177,800,000	***197,641,367***	52,169,109	33,767,712	1,080,000,000	1,333,500,000	***2,499,436,821***
			711,200,000	***731,041,367***				4,000,500,000	***5,166,436,821***

Ripple (domestic market): detailed calculations	
poultry sold in dometic markets ('000 head):	2,587,753
poultry sales loss ('000 head):	258,775
poultry sales loss (volume loss x lower price) ('000 US$):	491,673
rest of poultry sold in domestic markets ('000 head):	2,328,978
poultry sales loss (lower volume x price drop) ('000 US$)	465,796
Total poultry sales loss (monthly, '000 US$):	957,469
Total poultry sales loss ('000 US$):	957,469

Ripple (domestic market): detailed calculations	
poultry sold in dometic markets ('000 head):	2,587,753
poultry sales loss ('000 head):	1,035,101
poultry sales loss (volume loss x lower price) ('000 US$):	1,656,162
rest of poultry sold in domestic markets ('000 head):	1,552,652
poultry sales loss (lower volume x price drop) ('000 US$)	1,242,122
Total poultry sales loss (monthly, '000 US$):	2,898,284
Total poultry sales loss ('000 US$):	17,389,703

Ripple (export markets): detailed calculations	
poultry exports (tonnes):	8,630,000
poultry exports loss (tonnes):	17,260
poultry exports loss (volume loss x lower price) ('000 US$):	21,014
rest of poultry exports (tonnes):	8,612,740
poultry sales loss (lower volume x price drop) ('000 US$)	52,645
Total poultry sales loss (monthly, '000 US$):	73,658
Total poultry sales loss ('000 US$):	883,898

Ripple (export markets): detailed calculations	
poultry exports (tonnes):	8,630,000
poultry exports loss (tonnes):	86,300
poultry exports loss (volume loss x lower price) ('000 US$):	103,774
rest of poultry exports (tonnes):	8,543,700
poultry sales loss (lower volume x price drop) ('000 US$)	208,890
Total poultry sales loss (monthly, '000 US$):	312,664
Total poultry sales loss ('000 US$):	11,255,904

Global HPAI

	Period	Total	Year avg
Global number of poultry culled/dead ('000 head) (a)	*2005-06*	250,000	125,000
Global poultry population ('000 head) (b)	*2005*		12,938,767
Share of global poultry population (%)	*2005-06*	1.9%	1.0%
Global value of poultry trade loss ('000 US$) (c)	*2006*		2,000,000
Trade loss as % of global value of poultry exports (c) (d)	*2006/2003-04 avg*		19.0%
Global volume of poultry trade loss (tonnes) (d)	*2004-05/2003-04 a*	863,000	431,500
Trade loss as % of global volume of poultry exports (c) (d)	*2004-05*	10.0%	5.0%
World poultry price drop (%) (c)	*2004-05*	20.0%	10.0%
Loss in travel and tourism sector (% of global value) (e)	*estimate*		5.0%
Human infections: cases (f)	*2003-Feb 2007*	271	90
Human infections: dead (f)	*2003-Feb 2007*	165	55
Human infections: fatality rate (%) (f)	*2003-Feb 2007*	60.9%	60.9%
AI pandemic impact (GDP loss, '000 US$) (g)	*simulation*		400,000,000
AI pandemic impact (% fall in GDP) (g)	*simulation*		1%
AI pandemic impact (GDP loss, '000 US$) (h)	*simulation*		800,000,000
AI pandemic impact (% fall in GDP) (h)	*simulation*		2%
AI pandemic impact (GDP loss, '000 US$) (i)	*simulation*		2,000,000,000
AI pandemic impact (% fall in GDP) (i)	*simulation*		5%
Global GDP ('000 US$, nominal) (k)	*2005*		44,450,000,000
Global value of poultry trade ('000 US$) (d)	*2003-04 average*		10,550,000
Global volume of poultry trade (tonnes) (d)	*2003-04 average*		8,630,000
World poultry price (US$ per kg) (l)	*2003-04 average*		1.2
Global value of travel/tourism ('000 US$) (m)	*2004 est.*		1,500,000,000

Notes:

(a) FAO data, as at end of October 2006
(b) FAOSTAT, total chicken numbers
(c) FAO poultry meat outlook; FAO symposium, November 2006
(d) FAOSTAT, value and volume of global exports
(e) OEF analysis of a human pandemic assumes total halt in travel/tourism (A210) - here a milder impact is assumed following an AI in animals only.
(f) WHO (3 February 2007)
(g) Oxford Economic Forecasting, based on SARS, minimum cost
(h) World Bank estimates, based on SARS
(i) Oxford Economic Forecasting, based on SARS, adding 'trade multiplier effects'
(k) World Bank, IMF
(l) On average the value of trade divided by volume. In 2006, this was also the average export price for the US, Brazil and Europe, which together account for over 80% of world poultry exports.
(m) Global annual value of travel/tourism estimated by World Tourism Organisation (UN/WTO)

	Vietnam: HPAI	
	VND	**USD**
Total costs (2005) (a)	797,300,000,000	51,108,974
Total costs (2004-5) (a)	1,936,970,000,000	124,164,744
Total compensation provided (1)	267,991,000,000	17,178,910
Value of culled animals per head (2)	40,000	2.56
Compensation provided per head (3)	5,000	0.32
Restocking subsidy per head (4)	2,000	0.13
Culling and disposal costs per head (5)	3,900	0.25
Control costs per head (6)	3,000	0.19
Number of birds culled (2005)	*17,000,000*	
Total compensation (2005)	85,000,000,000	5,448,718
Total value of culled animals (2005)	680,000,000,000	43,589,744
Total restocking subsidy (2005)	34,000,000,000	2,179,487
Total culling and disposal costs (2005)	66,300,000,000	4,250,000
Total control costs (2005)	51,000,000,000	3,269,231
Number of birds culled (2004-5)	*41,300,000*	
Total compensation (2004-5)	206,500,000,000	13,237,179
Total value of culled animals (2004-5)	1,652,000,000,000	105,897,436
Total restocking subsidy (2004-5)	82,600,000,000	5,294,872
Total culling and disposal costs (2004-5)	161,070,000,000	10,325,000
Total control costs (2004-5)	123,900,000,000	7,942,308
Laying hen market value (7)	100,000	6.41
Poultry farming income (8)		
'Normal' (pre-outbreak)	600,000,000,000	38,461,538
'Normal' number of broilers sold	40,000,000	
'Normal' income per broiler	15,000	0.96
Crisis (average during crisis)	150,000,000,000	9,615,385
Total income loss during crisis	2,700,000,000,000	173,076,923

Notes:

(a) includes culling (value of culled animals and culling/disposal) and control costs

(1) To date central government budget allocated for AI amounts to 268 billion VND, which comes from the budget of the National Prevention/Emergency Fund and corresponds to some 15% of this budget (source: A3)

(2) Assuming that the provided compensation from the Fund (at 5,000 VND per head) only represents 10-15% of the real market value. This is the real 'lost income per head' (source: A3)

(3) Compensation for culling only, at 5,000 VND per head

(4) On the basis of the provided compensation from the Fund for restocking (at 2,000 VND per head)

(5) Cost estimates per bird on the basis of destruction and disposal of 200 chickens per farm (source: A7)

(6) On the basis of the provided compensation from the Fund. Includes control costs during and after the outbreak (i.e. equipment, facilities, disinfectants, protective clothing, staff in quarantine stations etc.)

(7) The market value of a layer is considered to be 100,000 VND/head (source: A3)

(8) Monthly sales by price. Income during 'normal' and 'crisis' periods calculated as follows:

At the lowest point of the crisis (Oct/Nov 2005), prices were 50 to 60% below normal, and volume of poultry sales had fallen from about 40 million poultry per month to 20 million (unofficial data, source: A9)

Price pre-crisis = VND 15,000/poultry. This is based on VND 10,000 /kg (semi-commercial farmer, source: A9), for an average 1.5 kg/broiler (productivity in Vietnam is relatively low, source: FAO).

Crisis period assumed to be an average over 6 months (in the beginning crisis has a higher impact on sales/prices, with return to normal the impact progressively diminishes).

Exchange rate: 1USD = VND *15600*

Vietnam: Country data

Broiler chicken (no of heads), 2005	195,000,000
Laying hens (no of heads), 2005	48,000,000
Total (2005)	243,000,000
Number of birds culled (2005) % of total	7%
Number of birds culled (2004) % of total	10%
Number of birds culled (2004-5) % of total	17%
Number of birds culled (2004-5 average) %	13%

source: FAOSTAT

Notes:

(a) It is estimated that 65-70% of the total poultry population is kept in backyard farms.

Large commercial systems represent 20-25% of the total poultry population and about 10-15% is kept in small commercial farms. (A16)

	Nigeria: HPAI				**Africa: HPAI**	
	Nigerian Naria (N)	**USD**			**USD**	**USD**
Total costs (Oct. 2006) (a)	1,068,760,000	8,389,011		Total costs (1 yr est)	151,340,659	
Total costs (est.) (a) (c)	2,313,696,000	18,160,879		Total costs (3 yrs est)		454,021,978
Total compensation (2006 est.) (c)(d)	655,855,200	5,148,000				
Value of culled animals per head	700	5.49		Value of culled animals per head		5.49
Compensation rate per head (d)	248	1.95				
Culling and disposal costs per head (e)	127	1.00		Culling and disposal costs per head (2)		1.00
Control costs per head (f)	49	0.38		Control costs per head (f)		0.38
Number of birds culled (Oct. 2006) (b)	*900,000*	*900,000*				
Number of birds died (Oct. 2006) (b)	*400,000*	*400,000*				
Number of birds culled (est) (c)	*2,640,000*	*2,640,000*		*Number of birds culled (3 yrs est) (1)*	*22,000,000*	*66,000,000*
Total value of culled/dead animals (Oct. 2006)	910,000,000	7,142,857		Total value of culled/dead animals (3 yrs est.)	120,879,121	362,637,363
Total culling and disposal costs (Oct. 2006)	114,660,000	900,000		Total culling and disposal costs (3 yrs est.)	22,000,000	66,000,000
Total control costs (Oct. 2006)	44,100,000	346,154		Total control costs (3 yrs est.)	8,461,538	25,384,615
Total value of culled/dead animals (est.) (c)	1,848,000,000	14,505,495				
Total culling and disposal costs (est.) (c)	336,336,000	2,640,000				
Total control costs (est.) (c)	129,360,000	1,015,385				
Market price (layer) (g)	700	5.49				
Market price (broiler) (g)	1,000	7.85				
Notes:						
(a) includes culling (value of culled animals and culling/disposal) and control costs						
(b) source: FDLPCS official data (A169)						
(c) assuming disease continues on same course (as in the first 2 months) - the total number of poultry losses in the first 2 months after outbreak first occurred (Feb 2006) was 440,000 (A258)						
(d) on the basis of gvmt announcement, compensation for culling only						
(e) cost estimates per bird on the basis of destroying and disposing of 1000 birds per day by ad hoc organised teams (source: A7)						
(f) assumted to the double that of Vietnam as more costly to organise (for culling/disposal costs per bird ratio of Vietnam to Nigeria was 4:1)						
(g) range of current chicken market price (source: UNDP Nigeria, A293)						
(1) In Africa, it is estimated that 5 % (around 66,000,000 poultry) of the total poultry population (1.320 billion poultry - poultry population of South Africa not included) would be culled within 3 years (A258)						
(2) It is estimated to cost about US$ 1.00 per bird (A258, A7)						
Exchange rate: 1USD = Nigerian Naria (source: EIU)	*127.4*					

Nigeria: Country data				**Africa**		
Broiler chicken (no of heads), 2005 (b)	140,000,000					
Laying hens (no of heads), 2005 (b)	119,000,000					
Number of birds culled (2006 est.) % (a)	2%			Number of birds culled (3 yrs est.) % (c)	5%	
source: FAOSTAT						
Notes						
(a) FAOSTAT reports an overlap between the two categories hence the total number is not the addition of the two.						
Other sources (e.g. WB, A203) give a total number of 175 million poultry, of which 143 million are free ranging.						
Nigerian official sources give a 140 million poultry total stock and this is the figure used in this calculation						
(b) It is estimated that 60% of the total poultry population is scavenging or backyard poultry.						
The highly industrialised and integrated poultry production systems represent 25% of the total poultry population and about 15% is kept in semi-commercial sector III farms.						
(c) In Africa, it is estimated that 5 % (around 66,000,000 poultry) of the total poultry population (1.320 billion poultry - poultry population of South Africa not included) would be culled within 3 years (A258)						

Public health effects of a pandemic influenza (1)

	Attack rate	Number of people (2)	Cost (million US$, 1995) (4)	Share of each category	Cost (million US$, 2005) (4) (5)	Cost as % of GDP (2005) (5) (6)
Hospitalisations	15%	314,000	1,928	2.7%	2,352	0.02%
	35%	734,000	4,499	2.7%	5,489	0.04%
Outpatient visits	15%	18,000,000	5,708	8.0%	6,964	0.06%
	35%	42,000,000	13,318	8.0%	16,248	0.13%
Clinically ill (3)	15%	20,000,000	4,422	6.2%	5,395	0.04%
	35%	47,000,000	10,317	6.2%	12,587	0.10%
Deaths	15%	89,000	59,288	83.1%	72,331	0.58%
	35%	207,000	138,340	83.1%	168,775	1.35%
Total economic impact (4)	15%		71,346	2.7%	87,042	0.70%
	35%		166,474	1.2%	203,098	1.63%

Notes:

(1) Mean estimates of the possible effects of an influenza pandemic in the US. (source: A5)
(2) The distribution of cases was based on lower and upper estimates of age-specific attack rates from the 1918, 1928-29, and 1957 epidemics and pandemics
(3) Mean number of clinically ill not seeking medical care but still sustaining economic loss
(4) Estimated costs, on the basis of medical costs and value of lost work days. Excludes other disruptions to commerce and society.
(5) Cost (in 1995 million US$) adjusted to 2005 $ value. In 2005, $1.00 from 1995 is worth: $1.22 using the GDP deflator
(6) 2005 GDP: 12,456 billion US $ (source: IMF)

Assumptions made

Category of PH impact	*Age group (yrs)*	*Mean Total cases at high risk (%)*
Death	*0-19*	*9.0*
	20-64	*40.9*
	65 +	*34.4*
	Total	*84.3*
Hospitalizations	*0-19*	*4.6*
	20-64	*14.7*
	65 +	*18.3*
	Total	*37.6*
Outpatients	*0-19*	*5.0*
	20-64	*10.4*
	65 +	*4.0*
	Total	*19.5*

Assumptions made		
Costs per case	***Age group***	***Costs ($)***
Death (Present Value of earnings lost)	*0-19*	*1,016,101*
	20-64	*1,037,673*
	65 +	*65,837*
Hospitalizations (total costs)	*0-19*	*3,366*
	20-64	*6,842*
	65 +	*7,653*
Costs days lost (indirect)	*0-19*	*325*
	20-64	*800*
	65 +	*650*
Medical costs (direct)	*0-19*	*3,041*
	20-64	*6,042*
	65 +	*7,003*
Outpatient visits (total costs)	*0-19*	300
	20-64	330
	65 +	458
Costs days lost (indirect)	*0-19*	*195*
	20-64	*200*
	65 +	*325*
Medical costs (direct)	*0-19*	*105*
	20-64	*130*
	65 +	*133*
Clinically ill (total costs)	*0-19*	*197*
	20-64	*202*
	65 +	*327*
Costs days lost (indirect)	*0-19*	*195*
	20-64	*200*
	65 +	*325*
Medical costs (direct)	*0-19*	*2*
	20-64	*2*
	65 +	*2*

The World Organisation for Animal Health (OIE)

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Feasibility Study –
A global fund for emergency response in developing countries

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Part II

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Part II prepared by Civic Consulting
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Acronyms

AI: Avian Influenza

ART: Alternative Risk Transfer

ASF: African Swine Fever

BSE: Bovine Spongiform Encephalopathy

CBPP: Contagious bovine pleuropneumonia

CSF: Classical Swine Fever

FAO SFERA: Special Fund for Emergency and Rehabilitation Activities of the FAO

FAO: Food and Agriculture Organisation of the United Nations

FMD: Foot-and-Mouth disease

GFATM: Global Fund to Fight AIDS, Tuberculosis and Malaria

GPAI: Global Programme for Avian Influenza

HPAI: Highly Pathogenic Avian Influenza

ND: Newcastle Disease

OIE WAHWF: World Animal Health and Welfare Fund of the OIE

OIE: World Organisation for Animal Health

PPR: Peste de Petits Ruminants

RD: Rinderpest

SARS: Severe Acute Respiratory Syndrome

STDF: Standards and Trade Development Facility of the WTO

TAD: Transboundary Animal Disease

UN CERF: United Nations Central Emergency Response Fund

WFP: World Food Programme

WTO: World Trade Organisation

Executive summary

Methodology used

This study was conducted by Civic Consulting[1] in the period November 2006 to March 2007 and updated in September 2007. The work was undertaken using desk research, literature review and construction of a detailed literature database. It also involved an economic analysis based on incentive theory, as well as consultations with key relevant institutions/authorities and experts and case studies of selected national compensation schemes for epidemic livestock diseases in four countries. Additionally, an analysis of the operational principles of five existing global funds was conducted to identify best practices.

Study focus

The study explores the need for and possible operational rules of a Global Emergency Response Fund for Animal Epizootics and Zoonoses (GERFAE) that would provide developing and transition countries with immediate funding to cover the cost of control measures and livestock owners' compensation costs.

Conclusions

The analysis conducted indicates that the global framework for the financing of costs and losses of epidemic livestock diseases was significantly improved during the last decade, partly as a consequence of the Avian Influenza crises and other large scale outbreaks of animal diseases. However, the framework is still characterised by significant shortcomings:

- Limited global support: Currently there is hardly any global structure for the financing of animal disease risk management for highly contagious transboundary animal diseases in developing countries other than related to Avian Influenza. This may lead to the underfunding of measures to prevent outbreaks of highly contagious transboundary animal diseases and may delay adequate responses to emerging diseases.
- Fragmentation of donor response: Current multilateral global funds/facilities do not provide an answer to the inherent challenges of the animal disease risk, namely its cumulative nature, which would require a system to cope with the resulting highly volatile funding needs caused by outbreaks of various sizes.
- Inefficiencies caused by lack of incentives for prevention: Little incentives are provided for developing countries to prevent crises by improving their Veterinary Services and their animal health status. Veterinary restrictions in case of outbreaks by major importing countries and related losses of export revenue can even be the source of strong adverse incentives for affected livestock industries and governments to delay reporting of disease outbreaks.
- No consistent policy on cost-sharing with farmers: Only few countries (and mostly these are developed economies) have a consistent policy to share responsibility and costs related to

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[1] With support from Agra CEAS Consulting (for sections 3.2.4, 6.2/5) and from the Institute of Risk and Insurance of Hamburg University (for sections 5.1/5 and 6.3/6)

outbreaks of animal diseases between government and livestock sector, which is a major incentive to upgrade bio-security in livestock production and also contributes to a financially sustainable animal health system.

The analysis of deficiencies indicates that it is still a significant challenge to develop an efficient global institutional framework to finance epidemic livestock disease risk, which addresses the limitations regarding mobilization and allocation of financial resources for epidemic livestock disease prevention and control for diseases other than AI, creates incentives for prevention at all levels and provides a mechanism to cope with the highly volatile nature of animal disease risk.

The study concludes that there is a need for a new global mechanism for the financing of animal disease risk management. *This could either be developed by extending the mandate of an existing fund/facility, for example developed in the framework of the AI crisis, or by creating a new instrument. For the aim of this analysis this question is not of significance, as the operational rules would be expected to be applied independent from the mechanism chosen and the hosting organisation(s).*

The report provides detailed suggestions for operational rules of a possible Global Emergency Response Fund for Animal Epizootics (GERFAE). It is suggested that the fund should operate on basis of guiding principles that include:

- ☐ The fund will encourage an effective and rapid emergency response for control of epidemic livestock diseases in developing and transition countries, *including through compensation of livestock holders*;
- ☐ The fund will function as a financial instrument, not as an implementing body;
- ☐ The fund will promote efficient global animal disease risk management;
- ☐ The fund will focus on diseases that pose a threat to “global public goods”;
- ☐ The fund will provide incentives for prevention and early reporting;
- ☐ The fund will safeguard ownership of the emergency response by the affected countries;
- ☐ The fund will encourage sharing responsibilities and costs to the extent possible.

The objectives of GERFAE could be in principle achieved by two different approaches:

- *Approach A:* GERFAE would provide support to eligible countries in case of an outbreak of a relevant disease and provide financial support for emergency response planning in times without outbreaks;

- *Approach B:* GERFAE would provide financial support to eligible countries in case of an outbreak of a relevant disease only. Global financial support for emergency response planning will be provided through other sources/mechanisms.

The analysis indicates the advantage of Approach A, under which GERFAE would also directly (co-)finance emergency response planning, as this would allow for the easiest feedback loops between recipient countries and GERFAE, which are needed for financial planning and management of the fund, and are likely to increase the transparency of the process.

The report in brief (extended summary)

This feasibility study was led by Civic Consulting and explores the need for and possible operational rules of a Global Emergency Response Fund for Animal Epizootics and Zoonoses (GERFAE) that would provide developing and transition countries with immediate funding to cover the cost of control measures and livestock owners' compensation costs. It is Part II of a series of economic studies on the financing of animal epizootics and zoonoses losses in developing and transition countries, commissioned by the OIE with support from the World Bank. The study has been based on a review of relevant best practices and an economic analysis based on incentive theory, as well as in depth case studies of selected national compensation schemes for epidemic livestock diseases (in Australia, Netherlands, Nigeria, Vietnam). In addition, the following existing global funds have been analysed: The UN Central Emergency Response Fund (CERF); the Global Fund to Fight AIDS, Tuberculosis and Malaria; the WFP Working Capital Financing Facility; the OIE World Animal Health and Welfare Fund; and the FAO Special Fund for Emergency and Rehabilitation Activities. The results of the analysis have been a basis for developing operational principles for a possible Global Emergency Response Fund for Animal Epizootics and Zoonoses, including principles for incentive-compatible compensation of affected livestock holders through Country Compensation Mechanisms.

Current financing of epidemic livestock disease costs in developing countries

Comprehensive data on financing of costs and losses of outbreaks of epidemic livestock diseases and related preparedness/prevention measures in developing countries is scarce. An overview of the donor commitments for Avian and Human Influenza indicates that in terms of commitments bilateral donors have by far the largest share. Multilateral development banks as well as the European Commission are also major donors, accounting for nearly one third of total commitments. Individual countries are the largest group of recipients, with international organisations receiving a share of less than 20%. Multilateral global trust funds currently play only a limited role, although an increasingly relevant one.

A total of five operational global funds/facilities with a significant focus on animal health are discussed, with a common feature of them being their recent date of establishment. The oldest of the funds is the Standard and Trade Development facility, which was set up in 2002, followed by the FAO SFERA (2003), the OIE WAHWF (2004), WB Avian and Human Influenza Facility (AHIF) and UN Central Fund For Influenza Action (CFIA) (both in 2006). The Avian Influenza crisis led not only to a significant increase of attention regarding animal health issues, but also to the declared intention of donors to better co-ordinate their initiatives. Activities funded by the above mechanisms differ significantly (see section 5.1.1), as does the degree to which funding is provided to external recipients from these funds/facilities, with some of the funds being mainly an internal instrument of contingency financing rather than a mechanism to provide project-based funding to eligible external recipients.

The analysis of the current global institutional framework for the financing of costs and losses of epidemic livestock diseases indicates significant progress during the last decade. There is more global coordination of donors and recipient countries, and there are an increasing number of multi-lateral financial initiatives and mechanisms, created mainly during the last few years. This is partly a response to the threat of Avian Influenza and other zoonoses, but also the consequence of an increased awareness for the need to have effective and efficient global mechanisms to address specific global problems or emergencies. Other important developments regarding the financing of the global response to animal health threats are:

- There is growing attention for a need to provide financial resources for preventing epidemic livestock diseases, including by assessing and improving the quality of the Veterinary Services to create a more uniform implementation of animal health standards;
- Emergency response plans are increasingly prepared and implemented in many potentially affected countries to respond effectively in case of an outbreak of Avian Influenza with global financial (and technical) support;
- Vaccine banks are being established that allow in case of outbreaks to respond rapidly with vaccination, therefore potentially reducing the need for large-scale culling operations that dramatically increase potential costs and losses;
- There is growing awareness for the need to compensate livestock holders in case of disease related culling. In 2006, for the first time global guidelines in this respect for developing countries have been developed and the Global Programme for Avian Influenza is the first major donor initiative to provide financial support for compensation of farmers in affected countries.

In spite of these positive developments, the global framework for the financing of costs and losses of epidemic livestock diseases is also characterised by significant shortcomings:

- Limited global support: Currently there is hardly any global structure for the financing of animal disease risk management for highly contagious transboundary animal diseases in developing countries other than related to Avian Influenza. This may lead to the underfunding of measures to prevent outbreaks of highly contagious transboundary animal diseases and may delay adequate responses to emerging diseases.
- Fragmentation of donor response: Current multilateral global funds/facilities do not provide an answer to the inherent challenges of the animal disease risk, namely its cumulative nature, which would require a system to cope with the resulting highly volatile funding needs caused by outbreaks of various sizes.
- Inefficiencies caused by lack of incentives for prevention: Little incentives are provided for developing countries to prevent crises by improving their Veterinary Services and their animal health status. Veterinary restrictions in case of outbreaks by major importing countries and related losses of export revenue can even be the source of strong adverse incentives for affected livestock industries and governments to delay reporting of disease outbreaks. The lack of incentives for prevention and the existence of adverse incentives can be expected to lead to significant inefficiencies, as large-scale disease outbreaks in the past have indicated.
- No consistent policy on cost-sharing with farmers: Only few countries (and mostly these are developed economies) have a consistent policy to share responsibility and costs related to outbreaks of animal diseases between government and livestock sector, which is a major incentive to upgrade bio-security in livestock production and also contributes to a financially sustainable animal health system.

The analysis of deficiencies indicates that it is still a significant challenge to develop an efficient global institutional framework to finance epidemic livestock disease risk, which addresses the limitations regarding mobilization and allocation of financial resources for epidemic livestock disease prevention and control for diseases other than AI, creates incentives for prevention at all levels and provides a mechanism to cope with the highly volatile nature of animal disease risk.

Possible role for a Global Emergency Response Fund for Animal Epizootics (GERFAE)

It does not seem very likely that it would be possible to improve the current financing of animal disease risk management purely through better coordination of the bilateral donor community. The reason for this is that there needs to be a party that is ultimately taking and managing the animal disease risks agreed upon with eligible countries, which will require considerable efforts and innovative approaches for risk management to be able to fulfil the agree commitments. It seems unlikely that any individual donor would be willing to take this responsibility. This clearly indicates the need for a new global mechanism for the financing of animal disease risk management. **This could either be developed by *extending the mandate of an existing fund/facility*, for example developed in the framework of the AI crisis, *or by creating a new instrument*. For the aim of this analysis this question is not of significance, as the operational rules would be expected to be applied independent from the mechanism chosen and the hosting organisation(s).**

The wider global framework for animal health has to fulfil functions that are indispensable for an efficient and effective response to any given outbreak of a relevant disease, including the setting of standards, and technical assistance, where there is a wide body of experience at key organisations such as the FAO, OIE, World Bank, regional programmes and, last not least, bilateral donors, that form the backbone of development cooperation in the area of animal health. Therefore, developing emergency response standards and technical assistance to implement them should as a general principle *not* be performed by GERFAE, but by other appropriate institutions of the global animal health framework. **GERFAE would mainly be a financial instrument**.

The new instrument GERFAE (or the existing fund/facility with an extended mandate) would therefore be different from existing mechanisms regarding the following aspects:

- It would focus on all eligible animal diseases, that by their nature require global intervention;
- It would focus on providing a financial mechanism for eligible developing countries to cope with the highly volatile nature of animal disease risk;
- The financial support provided would be conditioned as to create incentives for prevention at all levels;
- Its operational rules would take into account best practices from developed, transition and developing countries to enhance control of eligible animal diseases, including through compensation of livestock holders, while preventing the creation of adverse incentives through overcompensation.

Recommendations for operational principles for GERFAE

Principles and eligibility criteria

A Global Emergency Response Fund for Animal Epizootics and Zoonoses (GERFAE) would be an important element of an efficient global framework for animal disease risk management. It should operate on basis of guiding principles that include:

- ☐ The fund will encourage an effective and rapid emergency response for control of epidemic livestock diseases in developing and transition countries, *including through compensation of livestock holders*;
- ☐ The fund will function as a financial instrument, not as an implementing body;
- ☐ The fund will promote efficient global animal disease risk management;
- ☐ The fund will focus on diseases that pose a threat to “global public goods”;
- ☐ The fund will provide incentives for prevention and early reporting;
- ☐ The fund will safeguard ownership of the emergency response by the affected countries;
- ☐ The fund will encourage sharing responsibilities and costs to the extent possible.

The objectives of GERFAE could be in principle achieved by two different approaches:

- *Approach A: Providing financial support to emergency response and related planning.* GERFAE would provide financial support to eligible countries in case of an outbreak of a relevant epidemic livestock disease to implement a rapid emergency response and provide financial support for emergency response planning in times without outbreaks;
- *Approach B: Providing financial support to emergency response only*. GERFAE would provide financial support to eligible countries in case of an outbreak of a relevant epidemic livestock disease to implement a rapid emergency response only. Global financial support for emergency response planning will be provided through other sources/mechanisms.

The need for a linkage between the financial support to emergency response measures by GERFAE and emergency preparedness measures taken by recipient countries arises from both effectiveness and efficiency considerations. The effectiveness of an emergency response depends to a significant degree on the level of preparedness at an operational level reached before the onset of the emergency to enable a swift and timely response. Also, preparedness measures including emergency response planning are likely to reduce the costs of outbreaks of livestock diseases. The analysis indicates the advantage of Approach A, under which GERFAE would also directly (co-)finance emergency response planning, as this would allow for the easiest feedback loops between recipient countries and GERFAE, which are needed for financial planning and management of the fund, and are likely to increase the transparency of the process. However, in principle Approach B is also feasible, if other appropriate global mechanisms provide financial support for emergency response planning and it is safeguarded that the needed information on the emergency response planning is provided to GERFAE.

The overall budget of GERFAE is likely to be inadequate to cover all outbreaks of epidemic livestock disease for developing and transition countries lacking adequate resources and capacity. Therefore under both Approach A and Approach B a set of eligibility criteria has to be developed, that define whether in principle a disease, measure/activity and country is eligible for support. Recommendations for eligibility criteria include:

⇒ ***Eligible diseases, that may trigger support of GERFAE in case of an outbreak, should be determined on basis of the following criteria***

- The public relevance of a livestock disease (depending e.g. on contagiousness and public health impact);
- The need for global coordinated action;
- The character of a livestock disease as relevant emerging risk.

Depending on the available resources a global emergency response fund could have separate windows to support the emergency response regarding outbreaks of the following diseases (in order of priority):

- *Category 1: Emerging livestock diseases* of high public relevance with a need for global coordinated action;
- *Category 2: Other priority epidemic livestock disease(s)* of high public relevance with a need for global coordinated action;
- *Category 3: Under-funded diseases* of high public relevance with a need for regionally coordinated action, where countries in the affected region lack adequate domestic resources and capacity to combat the outbreaks and there are clear indications for a risk of global impact if adequate disease control measures are not taken.

⇒ ***In principle, all emergency response measures that are supported from GERFAE should be co-financed in kind or in cash by the recipient country.*** Co-financing requirements may differ for specific categories of emergency response measures and have to be pre-defined within each country emergency response plan to increase transparency and reduce the administrative burden related to documentation and audit.

⇒ ***Country emergency response plans for specific disease outbreaks should define performance indicators for specific emergency measures.*** Performance indicators should be pre-agreed between the recipient country and GERFAE and form the basis for decisions to be made on a possible continuation of GERFAE assistance after the initial emergency response. Indicators should also reflect the duties of the recipient countries as members of relevant organisations such as the OIE to minimise the risk of the spread of animal diseases, e.g. through early reporting of suspicious disease cases.

⇒ ***It is recommended that countries have to fulfil a set of eligibility criteria to receive financial support for emergency response measures from GERFAE, namely:***

- To have in place a pre-defined and costed country emergency response plan for relevant diseases; and earmarked contingency funds to co-finance measures;

- To have a Country Compensation Mechanism in place to be eligible for support to compensation payments to livestock holders;
- To have conducted a PVS evaluation of the Veterinary Services and to develop and implement a country strategy to upgrade Veterinary Service to address relevant deficits identified;
- To have a country emergency management facility in place that can coordinate measures in case of an outbreak;
- Finally, there needs to be an eligibility criterion related to the income level of the recipient countries, with a limit to be set in a transparent way with the aim to target scarce resources to countries most in need, while not excluding countries where a GERFAE intervention would make a difference. Only in exceptional cases upon a decision of the Governing Board would GERFAE finance to a limited degree emergency response measures in specific low-income countries that do not fulfil the above mentioned criteria.

Mobilisation of funding

Initial soundings on the issue of mobilisation of funding have been undertaken with a number of potential donors, which highlight certain points:

1) Amongst national donor agencies the desire to contribute to such a fund has to be viewed in the context of a permanent tension between – what are perceived as – the ‘benefits’ of bilateral support compared to support channelled through multilateral agencies.

2) It was also noted that complementary action was needed “to help the livestock industries in developing countries access markets once they've controlled diseases and outbreaks of diseases”. Thus, it was deemed essential that disease control be driven by the powerful incentive of the prospect of increased sales and revenue for farmers and countries.

3) Beyond this, assuming the establishment of GERFAE were to be accepted there is the key issue of accountability. While donors are willing to accept a ‘trust fund’ managed by an intermediary such as the World Bank which ‘signs off’ on the accounts this may also be difficult to achieve.

In terms of the scale of the required funds, the analysis undertaken in Part I on the potential costs of an outbreak is of relevance here. Under the ‘most likely’ scenario of this analysis, the total direct disease losses and control costs of an outbreak are estimated to range between US$ 5.3 billion in the case of scenario A (H5N1 infected countries), US$ 6.1 billion in scenario B (infected and non-infected at immediate risk countries), and US$ 9.7 billion in scenario C (all OIE developing country members), calculated on an annual basis. All these costs exclude on-farm losses from business interruption. In the particular case of LDCs (Least Developed Countries), the costs are presented separately. An analysis by country groups is of relevance because it is suggested to introduce an income eligibility criterion, for example one that allows access only to LDCs. Under the most likely scenario, in the event of an HPAI outbreak the estimated direct impact (excluding consequential losses) for the LDCs as a group ranges from US$ 73 million per year in scenario A (only 4 LDCs affected) to US$ 258 million in scenario B (8 LDCs affected) and nearly US$ 600 million if all 50 LDCs were to be affected (scenario C).

The projections quoted above are estimates of total direct disease losses and control costs, and may not be equated with the financial need of GERFAE. Several factors influence the financial need of GERFAE, including:

- Income eligibility criterion concerning eligible countries;
- Eligible diseases;
- Eligible measures;
- Co-financing rate required;
- Compensation rates applied;
- Types of costs compensated.

Assuming scenario B prevails (i.e. an HPAI outbreak that touches the countries currently listed as infected and non-infected at immediate risk) and on basis of an average compensation rates at 75% and a co-financing rate for eligible countries of 50%, the total required annual budget for GERFAE regarding HPAI would amount to US$ 103 million for the LDCs affected under scenario B, or US$ 2.45 billion on a global level. This illustrates the need for decisions early on in the planning process regarding eligible disease and measures as well the income eligibility criterion for GERFAE.

It has to be underlined that the results above have to be interpreted with great care and the assumptions for each scenario, as well as the limitations of the model, have to be taken into account (see Part I). Capital needed to finance emergency response measures of GERFAE cannot be estimated easily. There may be years without any disease outbreaks in recipient countries, and periods with numerous and/or large-scale disease outbreaks, which would require significantly more funding from GERFAE. That means total capital outlays for emergency response measures during a given budgeting period are variable, and an elaborated system for managing the risk of the fund has to be developed (see section 6.6). In the mid-to long term, epidemiological models that can be used to provide information for parameters describing the spread of diseases and potential magnitude of disease losses in eligible countries have to be developed, that can be used to narrowing down the range of scenarios.

This leads to the following recommendation:

⇒ ***Decisions on the eligible countries, diseases and measures, the co-financing rate required; compensation rates applied and types of costs compensated have to be taken early on in the planning process of GERFAE, as this significantly impacts on the budget required.*** Due to the variability of capital requirements for emergency response measures during a given budgeting period, an elaborated system for managing the risk of the fund has to be developed.

Compensation of livestock holders

Countries eligible for GERFAE support for compensation payments to livestock holders would be required to establish a Country Compensation Mechanism. Incentives of livestock holders to undertake risk management measures strongly depend on the principles according to which a Country Compensation Mechanism (CCM) operates. Regarding the question of what kind of organisational set-up a CCM should have to fulfil this compensation function, there is no globally valid best practice. The state of the Veterinary Service, the existing structure and the diversity of a country's livestock sector determine the institutional arrangement of a CCM, which could be implemented with a Central Animal Health Fund, a

Regional Animal Health Fund, Sector Agreements, etc. The formal integration of livestock holders, e.g. representatives of farmer's organisations, is likely to increase acceptance and performance of the Country Compensation Mechanism, and is also considered best practice in existing cost-sharing schemes for epidemic livestock diseases.

The need for a close linkage between Country Compensation Mechanism and Veterinary Service arises from several factors. Firstly, emergency response planning of the Country Compensation Mechanism to cope with emerging compensation claims is directly related to the emergency planning of the Veterinary Service regarding culling. Secondly, the availability of data on livestock holders/establishments that provide at least approximate information about the number and species of animals in a country's regions is equally important for the Veterinary Service and the Country Compensation Mechanism, in both emergency planning and emergency response. Thirdly, actual control measures including culling are carried out under the authority of the Veterinary Services, and timely compensation requires a very close cooperation in operational terms. Finally, the availability of contingency funds/a relevant government budget line to (co-)finance emergency response measures is equally relevant for both Veterinary Services and Country Compensation Mechanism.

This leads to the following recommendation for set up and operation of a Country Compensation Mechanism:

⇒ ***A Country Compensation Mechanism has to be to be adapted to a country's Veterinary Service infrastructure and livestock production structure.*** The institutional set-up of a Country Compensation Mechanism has to allow for close cooperation with the country's Veterinary Service because compensation is a key element of emergency response. In establishing a Country Compensation Mechanism, it should be drawn on existing social, political and industrial institutions in order to increase acceptance and reduce set-up costs. To avoid collusion, the use of independent financial auditors is recommended.

Providing incentives for early disclosure and compliance with veterinary restrictions

Operational guidelines of a Country Compensation Mechanism should encourage livestock holders to notify disease outbreaks to the Veterinary Service in due time and to comply with veterinary control measures. A simple mechanism to provide incentives for alertness, thus enabling the early observation of disease symptoms is to apply different compensation rates for healthy, visibly diseased and dead animals. The differentiation between healthy, visibly diseased and dead animals does not make high demands on the culling team's veterinary skills. The rule also does not undermine the incentive compensation payments provide for disease notification, since reduced compensation rates for diseased and dead animals just reflect the reduced values of visibly diseased and dead animals on the market.

Besides early disclosure, successful disease control and eradication requires imposing restrictions on livestock production in and around the location of a disease outbreak. Experience with compensation in both developing and developed countries indicates compensation rates need to be low enough to avoid encouraging farmers from still disease-free areas from presenting their animals to be culled, importing animals into culling zones or expanding culling zones through intentional infection. On the other hand, the upper limit for compensation simply is the market value. No rational livestock holder would seek culling of his animals when compensation would not exceed the animals' market value.

This leads to the following recommendations:

⇒ ***A Country Compensation Mechanism should compensate visibly diseased animals at half the rate of healthy animals. Dead animals should not be compensated at all,*** although there may be exceptions under specific circumstances. The compensation of culled animals as such provides incentives to notify suspected disease outbreaks to the Veterinary Service as it reduces a livestock holder's costs of disease notification, which could lead to culling of the herd. Additionally, taking into account the number of dead and visibly diseased animals provides incentives for livestock holders to regularly check the herd's health status as it imposes costs on delaying notification of suspected outbreaks.

⇒ ***A Country Compensation Mechanism should apply compensation rates that are sufficient to induce early disclosure and compliance with culling orders, but do not create adverse incentives for livestock holders to seek culling.*** Compensation rates for culled animals need to exceed a certain level to induce farmers to notify suspected disease outbreaks and to hand over animals to culling teams when they are located in a culling zone. They may under no circumstances be higher than market values and have to be determined on basis of type-specific animal values. The values have to be adjusted during longer outbreak situations to prevent adverse incentives resulting from large deviations between compensated values and actual market prices.

Differentiation of different livestock production sectors

Registration of livestock holders is an important precondition for effective and efficient animal disease risk management, including a functioning compensation system. However, in most countries a complete registration of livestock holders cannot be reached. Especially in countries with many backyard holders, registration would involve prohibitively high administrative efforts. Hence it should be aimed at achieving registration of farms above a certain size with the Veterinary Service. An incentive-based approach for this is to determine a maximum number of livestock compensated per unregistered livestock holder in case of an outbreak, i.e. a compensation limit. This would provide a clear incentive for registration to farmers. Experiences in other sectors indicate that this type of incentives work in practice. In case of an outbreak and culling, unregistered farms exceeding this maximum number of animals would not be compensated for those animals above the maximum number. This guideline would after a transition period split a country's livestock production industry into two sectors: Registered *commercial livestock producers* characterised by exceeding a certain farm size, and unregistered, *small-scale and backyard livestock holders*.

This leads to the following recommendation aiming at achieving an efficient level of registration of livestock producers:

⇒ ***A Country Compensation Mechanism should define a maximum number of animals for each specie that are compensated in case of culling, if the livestock holder is not individually registered.*** This maximum number of animals is the borderline between individually registered commercial livestock producers and small-scale and backyard livestock holders, who are not individually registered. The maximum number of animals to be compensated without registration should reflect the capacity of the Veterinary Service of the country. An appropriate borderline should be chosen so that the Veterinary Service can administer registration and fulfil its control function regarding commercial livestock producers. Unregistered livestock holders should not be compensated for culled animals above the maximum number.

Compensation of commercial livestock producers

Evidence from countries with Avian Influenza outbreaks has shown that a compensation rate of 50% of the animal value can be enough, if veterinary restrictions are accompanied by strong control efforts in order to prevent a violation of restrictions. A compensation rate of over 100% is generally not recommended because of the creation of adverse incentives. Based on these international experiences it is suggested to provide *higher compensation rates to commercial livestock producers meeting higher pre-defined bio-security standards*. As simplicity is key, the pre-defined criteria that determine a commercial farm's bio-security level need to be easily observable and verifiable, e.g. indoor keeping, fencing, all-in-all-out production documented in records, documented regular veterinary checks etc.

The report provides the following recommendations concerning the compensation of commercial livestock producers :

⇒ ***Animal losses of commercial livestock producers due to culling should be compensated according to the bio-security level of the farm.*** Low, moderate and high bio-security farms should be compensated at rates of 60%, 75% and 90 % of the type-specific animal value for healthy animals and half of these rates for visibly diseased animals. Criteria for bio-security have to be pre-defined and communicated to farmers to provide incentives for taking the relevant measures.

⇒ ***Compliance of commercial livestock holders with veterinary restrictions can either be achieved through an incentive-based approach by also compensating business interruption and other losses caused by veterinary restrictions, or through policing of livestock holders in disease outbreak situations.*** During long outbreak situations, livestock holders under movement restrictions could be worse off than livestock holders with infected herds if only animal losses due to culling are compensated. In these cases, adverse incentives are created and compliance with veterinary restrictions has to be massively controlled through deployment of police or military forces.

⇒ ***As soon as this is feasible, the GERFAE Governing Board should require Country Compensation Mechanisms from eligible countries to share costs and responsibilities with commercial livestock producers.*** Contributions of livestock holders to the CCM according to farm size are socially acceptable and would not have negative effects on animal disease risk management of livestock producers. Because of the related advantages, GERFAE should encourage cost-sharing in recipient countries even before it becomes a formal eligibility criteria.

Compensation of small-scale and backyard holders of livestock

Although it is unrealistic to achieve individual registration of small-scale and backyard livestock holders with the Veterinary Service in developing and transition countries, it is crucial for successful planning and carrying out of an emergency response to have some data available regarding livestock densities in different parts of the country. One way to obtain this is a regular census of livestock. Another way is to promote aggregate registration of livestock kept in one village or region, for example. The approach developed in this study is to formally treat these small-scale and backyard livestock holders as one entity in terms of the Country Compensation Mechanism. This entity will be referred to as a production community. A production community creates opportunities to transmit information to backyard holders of livestock; it could therefore enhance individual capabilities of risk management. The main advantage of the production community however is that it renders small-scale and backyard livestock holders, which must be considered as uncontrollable livestock producers, accountable. This can be achieved through a community-based compensation approach.

In case of an outbreak, compensation payments would have to be determined according to the animals culled in the production community. The rules for a reduction of compensation payments would also be community-based, i.e. *high numbers of visibly diseased and dead animals would reduce compensation payments to the community as a whole. The individual livestock holder however receives a fixed share of total community compensation, which represents his share in the number of animals culled as specified in the culling records.* The individual livestock holder's share would not depend on the disease status of his animals at the time of culling. Therefore the individual backyard holder has a significant incentive to provide diseased and dead animals to the culling team for disposal, thereby reducing dramatically the risk for illegal sale of these animals on local markets. On the other hand, the total compensation that the production community receives will be determined according to the compensation rules described above, i.e. reduced depending on the number of diseased and dead animals in the community as a whole. This means that any diseased or dead animal reduces the amount paid per animal to all members of the production community, leading to a collective interest in early reporting and higher bio-security.

Small-scale producers and backyard holders usually have very low or no bio-security. Many bio-security measures seem unrealistic to achieve for these production systems, e.g. closed poultry production and the like. However, there are measures to reduce animal disease risk even on a small-scale or backyard production level. For example, ensuring access to clean water, fencing birds' farmyards and separation of sick birds are measures that can reduce the risk of attracting Avian Influenza and that can be implemented in small-scale and backyard production systems. It is recommended to provide explicit incentives for improving bio-security in production communities however in order to forward the process of improving bio-security in the small-scale and backyard sector. Similarly to commercial livestock producers, it is therefore suggested to differentiate compensation levels in order to provide incentives for production communities to undertake those kinds of measures, e.g. participation with disease awareness programs or the like.

This leads to the following recommendations regarding production communities of small-scale and backyard livestock holders:

⇒ ***Small-scale and backyard livestock holders should be encouraged to form production communities to increase collective responsibility and communal accountability for animal health.*** The geographical outline of a production community has to reflect structural aspects of animal disease risk management. The set-up of a production community should draw on existing administrational structures and social networks.

⇒ ***Animal losses due to culling incurred by small-scale and backyard holders of animals that are member of a production community should be compensated according to the bio-security level of the production community.*** Animals from production communities that do not take specific precautions should be compensated at rates of 75% of the type-specific animal value for healthy animals and half of these rates for visibly diseased animals. For production communities adhering to certain verifiable bio-security measures this rate should be increased to 90%. The compensation payment is community-based, and individual compensation therefore does not depend on the health status of the own animals, but on the health status of all animals culled in the community. This incentive structure increases collective responsibility and communal accountability for animal health.

Compensation outside of production communities

Although the organisation of small-scale and backyard livestock holders in production communities would be beneficial from a disease risk management point of view, this is an new approach at this stage and needs to be tested before its feasibility can be finally assessed. Experiences in countries such as Vietnam seem to indicate that it is possible to channel compensation payments through existing communities. However, it is clear that in some regions or countries the formation of production communities may not be feasible at all. It requires existing social structures, which may not exist in outskirts of large cities with a high turnover of migrant population, for example. It also requires trust in existing institutions, as the incentives provided are future compensation payments, and therefore a minimum of trust is required that commitments before an outbreak will be valid after the outbreak. If no trusted institutions are available, such an approach cannot work.

Although the most common situation currently, an environment of atomised backyard holders of livestock is most problematic from a risk-management point of view: Backyard holders are very difficult to reach – both to increase awareness for prevention/bio-security, and for control measures in case of an outbreak. The compensation guidelines should therefore provide clear incentives for small-scale and backyard livestock holders to form production communities, if the system is assumed to be feasible in the particular country. In addition, it is possible to introduce a higher *first-notification compensation rate* for the compensation of small-scale and backyard livestock holders to induce early reporting of disease cases.

This leads to the following recommendations for compensating losses of small-scale and backyard livestock holders outside of production communities:

⇒ ***Losses due to culling of animals of small-scale and backyard livestock holders outside of production communities should be compensated at rates of 60% of the type-specific animal value for healthy animals and half of this rate for visibly diseased animals.*** Low compensation rates provide an incentive for the formation of production communities, if introduced in the country. Policing of veterinary restrictions is needed however to ensure compliance of the small-scale and backyard livestock holders outside of production communities with veterinary restriction, as social control mechanisms do not exist.

⇒ ***An additional incentive for early disclosure could be provided by a special first-notification compensation rate of 90% of the animal value for backyard holders***. First-notification compensation rates of 90% of the animal value should only be considered for the compensation of the first individual livestock holder in each region that notifies the outbreak of a particular disease.

Governance arrangements

In the context of GERFAE, to facilitate optimal coordination of emergency planning and response, both activities should be funded by one mechanism under one management structure. Of the models analysed in the study, an explicit collaboration of relevant institutions (with one of them having a Trustee function) is perhaps more appropriate to further encourage streamlining of global efforts in the area of animal disease risk management and involve expert input within the more day-to-day activities of the fund. Involving agencies with core spheres of expertise appears to be the more holistic approach for a coordinated and efficient animal disease risk management. By encouraging interagency collaboration in such a manner it is more likely that coordination with other donors, stakeholders and activities is safeguarded.

It is recommended that the GERFAE should also follow the standard governance structure of a Governing Board, an Advisory Panel and a GERFAE Secretariat. The Governing Board should represent donors, eligible countries and, depending on the hosting arrangements, the leading Technical Agencies. The composition of the Board should reflect the funding efforts of all donors and the role of eligible countries and their regional organizations to encourage eligible country ownership and voice within the GERFAE function and process. It could potentially include observing or nonvoting members from other stakeholder groups that have an interest or expertise in animal health, such as the veterinarian, farmer organization, food industry community or NGOs that can assist governments in implementation of eligible measures. The Technical Agencies should be responsible for establishing the Advisory Panel, which could also include these other stakeholders groups, to provide objective scientific and technical advice to the GERFAE Governing Board.

This leads to the following recommendation for governance arrangements of GERFAE:

⇒ ***GERFAE should be created through a collaboration of relevant institutions. One institution should manage the day-to-day running and management of GERFAE, possibly in a Trustee function, in close cooperation with expert Technical Agencies.*** Such an arrangement would recognize the need for institutional arrangements to optimise efficiency and cost effectiveness of GERFAE activities, ensuring emergency planning and response plans to be funded by GERFAE are country-driven, appropriately prepared and executed and part of a greater, coordinated framework of national, regional and global animal disease risk management. Existing institution expertise should be leveraged.

⇒ ***GERFAE should have a governance structure which includes a Governing Board, an Advisory Panel and a Secretariat.*** The structure must safeguard against overlap and redundancy of initiatives to ensure efficiency of coordinated action and to build eligible country ownership and voice within the GERFAE process. It should ensure transparency, accountability and efficiency of stakeholder involvement and activities, and review, develop, monitor and evaluate GERFAE policies, operational and application funding guidelines.

Payment procedures / monitoring

The question of payment procedures and monitoring of GERFAE payments to eligible countries can be addressed at two levels: First at the level of the fund itself i.e. the relation between the fund and recipient governments and secondly at the level of disbursement of compensation payments to livestock holders through a Country Compensation Mechanism. In both cases, it is essential that a clear audit trail is established. In the case of GERFAE itself and its relation to both donors and recipient governments it is essential that it provides for and sets aside the necessary budget and obtains the necessary expertise to ensure that the plans for fund disbursement are sound and workable i.e. there is 'pre-vetting' and that following a disbursement a verifiable audit trail exists. Establishing this type of audit trail mechanisms for recipient governments is a well-established practice of donors and will not be discussed here in depth.

The major challenge is, however, to have a similar audit trail at the level of the disbursement to the final beneficiary through the Country Compensation Mechanism that any beneficiary country will have to establish to qualify for GERFAE support. Experience with other supranational compensation mechanisms shows that creating an audit trail for compensation costs is feasible, but can lead to a very high administrative burden for performing the audits and also lead to significant delays. Therefore GERFAE needs to delegate as much auditing functions as possible through the use of independent financial auditors.

This leads to the following recommendation:

⇒ ***Once the fund is operational the GERFAE Governing Board, with guidance from the Advisory Panel and Technical Agencies, must establish an audit and monitoring processes, taking into account experiences of the ongoing projects funded through the Global Program for Avian Influenza.*** The processes should be reviewed regularly, adapted and result in GERFAE guidelines and requirements for eligible countries. GERFAE needs to delegate as much auditing functions as possible through the use of independent financial auditors, to be contracted when a Country Compensation Mechanism is set up.

Managing the risk of GERFAE

Without adequate provisions or in the absence of risk management measures, in case of a relevant outbreak of animal disease GERFAE has to provide funds rapidly to support emergency measures in eligible countries, even before related donor contributions are received. The timing of contributions to GERFAE and the release of funds for emergency measures can therefore be expected to differ, leading to a temporary deficit. The challenge is to find a financing strategy that addresses these temporary shortcomings and to prevent structural deficits which could arise in case of a catastrophic animal disease crisis.

A risk financing approach to managing GERFAE expenditure risk within a given budgetary period is recommended. Firstly, the initial working capital of the fund has to be established through donor contributions that are sufficient to finance expenses for emergency preparedness planning (under approach A) and emergency response measures under relatively certain capital outlay scenarios within the given period. Secondly, contingent grants from donors or other actors could be used to finance further emergency expenditures when needs are higher, so that GERFAE is a sustainable financing tool to support global animal disease risk management, but one that is to a certain extent self-sufficient from appealing for additional donor contributions in “normal” or “moderate” years. In periods with several outbreaks or significant large-scale outbreaks, which require further substantial emergency capital outlays, pre-arranged contingent loan agreements could be triggered to provide additional capital in order to ensure continuation of GERFAE’s animal disease risk management operations. GERFAE should be principally able to pay back contingent loans in following periods.

This leads to the following recommendation:

⇒ ***It is strongly recommended that ex-ante contingent agreements should be arranged as opposed to negotiating ad hoc capital provision when capital is needed.*** This is for *timely* and *reliable* financing, with funds made available immediately under the specifications of a contingent agreement. The timing of funding is critical to the efficient response and deployment of emergency measures, and the security of sufficient funding when needed is a strong incentive for efficient and thorough contingency planning and emergency preparedness. Ex-ante negotiations save time and budgetary surprises in moments when time and money is most scarce and offer security to enable efficient financial planning and capital allocation.

Of course, an element of flexibility should also remain in these arrangements as understanding and quantifying potential global animal disease risk exposure and hence GERFAE expenditure risk is scientifically and technically challenging and will always be subject to uncertainty and modelling error. GERFAE should, however, be able to continue its operations in situations that require more funding. As the majority of the funding sources outlined above are public sector driven it is recommended that GERFAE also targets developing access to the international risk markets to relieve the burden of animal disease risk financing from donor budgets. Financing instruments such as those described in Annex 1 could and should be developed in the future with the aim to enable access for GERFAE to risk transfer tools and the risk capacity of the international reinsurance and capital markets, for example through insurance, derivative contracts or other risk transfer solutions such as risk smoothing structures or finite financing arrangements.

1. Introduction

Aim of the study

This feasibility study explores the need for and possible operational rules of a Global Emergency Response Fund for Animal Epizootics and Zoonoses (GERFAE) that would provide developing and transition countries with immediate funding to cover cost of control measures and livestock owners' compensation costs. It is Part II of a series of economic studies on the financing of animal epizootics and zoonoses losses in developing and transition countries, commissioned by the OIE with support from the World Bank. The feasibility study was conducted by Civic Consulting (project lead and overall consortium lead) with support from Agra CEAS Consulting (for sections 3.2.4, 6.2/5) and from the Institute of Risk and Insurance of Hamburg University (for sections 5.1/5 and 6.3/6).

Structure of the report

The structure of this report is as follows: Section 2 details the methodology employed for the study. Section 3 presents an overview of the operational principles of selected existing compensation schemes for epidemic livestock diseases (Australia, the Netherlands, Vietnam, Nigeria). Section 4 provides an overview of selected global funds for developing and transition countries. Options for a global institutional framework for the financing of costs and losses of epidemic livestock diseases are considered in Section 5. Recommendations for main operational principles for a Global Emergency Response Fund for Animal Epizootics and Zoonoses are proposed in Section 6. This includes the principles of GERFAE, mobilisation of funding, compensation of livestock holders, payment procedures, governance arrangements, and managing the risk of GERFAE.

Acknowledgments

This analysis would not have been possible without the support from many sides, including veterinary authorities in several countries and interview partners at the global funds scrutinised for this report, including the UN Central Emergency Response Fund, the Global Fund to Fight AIDS, Tuberculosis and Malaria, the World Food Programme Working Capital Financing Facility and the World Organisation for Animal Health (OIE) World Animal Health and Welfare Fund as well as the FAO Special Fund for Emergency and Rehabilitation Activities. We also would like to thank organisations, such as *Agronomes et Vétérinaires Sans Frontières*, the European Commission (EC), the French National Institute of Agriculture Research (INRA), the Organisation for Economic Co-operation and Development (OECD) and the World Bank, which have authorized their experts to review the draft reports in depth. We would like to express our gratitude to the experts that provided very helpful written comments.[2] We also would like to thank Alain Dehove of the OIE and François Le Gall of the World Bank for the support and guidance provided throughout the study.

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[2] Participants in the peer-review process were asked to provide their expert opinion, without necessarily expressing the view of their organisation.

2. Methodology

This study has been based on in depth case studies of selected national compensation schemes for epidemic livestock diseases and of selected existing global funds, an economic analysis based on incentive theory and a review of relevant best practices, including through interviews and analysis of existing studies and relevant reports and studies. These elements are detailed below:

Case studies compensation schemes

Compensation schemes in four different countries were selected for in-depth analysis. Each scheme is described in detail and the financial mechanisms are explored, as are the incentives provided by the schemes, and the level of responsibility their respective stakeholders hold. To guarantee diversity, the following criteria were taken into account when selecting the countries:

- The level of economic development;
- Outbreak of a major epidemic livestock disease in the past five years and/or innovative approach of the scheme;
- Data availability.

Australia, the Netherlands, Vietnam and Nigeria were selected for the case studies. Available literature on the selected schemes was scrutinized, and contact with the responsible national authorities and/or other country sources was established to collect data on the schemes and evaluate relevant experiences. Dimensions of the compensations schemes analysed include the institutional framework and the governance of scheme, the sources of funding, the coverage of the scheme and the compensation procedures. The interview process was complemented by conducting a global survey and interviews through regional cases studies on insurance and compensation schemes that is described in more detail in Part III (Pre-Feasibility Study on Market-Based Insurance Products for Emerging and Re-emerging Animal Disease Losses not Covered by Public Compensation).

Case studies global funds

There is a significant body of experience with global funds for developing countries and transition countries that are operational or planned, including emergency funds related to humanitarian aid, desert locust management, storms etc. The study focused on selected global funds that are of interest in terms of their aims and character, namely the UN Central Emergency Response Fund; the Global Fund to Fight AIDS, Tuberculosis and Malaria; the WFP Working Capital Financing Facility; the OIE World Animal Health and Welfare Fund; and the FAO Special Fund for Emergency and Rehabilitation Activities. Available documentation on the selected funds was reviewed and data-gaps were identified. On basis of an evaluation grid, in-depth phone interviews were carried out with the fund managers. Dimensions of the funds analysed include mobilisation of funding, intervention rules, governance and strengths and weaknesses.

Economic analysis

The starting point of the economic analysis conducted in the framework of the study is that due to externalities in the risk management of epidemic livestock diseases, a possible role of the Global Emergency Response Fund for Animal Epizootics should be to make sure that disease prevention and control measures are undertaken on an efficient level. The analysis is based on the theory of externalities, a widespread economic issue that often requires public market intervention to produce efficient results. One way to induce efficient prevention and control is to provide incentives through conditional compensation payments. Incentive theory and its application in economic models regarding insurance contract relationships is the theoretical background of this analysis. The dominant structure of these models is a principal-agent relationship. This is the relationship between risk-ceding agents, which are in the context of this study the governments of eligible OIE member countries and the livestock holders in these countries, and a risk-taking principal, which is the newly to be created Global Emergency Response Fund for Animal Epizootics. For the purposes of this analysis, the role of the fund can be interpreted as being an insurance facility for countries facing outbreaks of epidemic livestock disease to finance compensation payments. The implications of the models of insurance economics that will be referred to in the analysis are empirically tested and approved in many different insurance relationships. The analysis provides conclusions with respect to preconditions for compensation schemes that recipient countries have to introduce to be eligible for payments from the fund and the definition of compensation rules that should be applied, differentiating between professional livestock farmers and backyard holders of animals. The analysis takes into account best practices identified in the prior analysis of global funds and the “lessons learned” from experiences of compensation schemes for epidemic livestock diseases, as well as the results of the cost-benefit analysis presented in Part I (Economic impact of diseases and Cost-Benefit Analysis of Improved Disease Prevention and Rapid Control).

3. Operational principles of selected existing compensation schemes for epidemic livestock diseases

3.1. Introduction

Governments approach compensation for owners of culled livestock in the event of epidemic livestock disease outbreaks in various ways. Often this compensation is provided only as an ad-hoc measure by the government to the affected sector based on compensation rules that are defined ex-post, i.e., after the crisis occurred, which may lead to administrative and other problems and does not provide incentives for risk-management of farmers. Ad-hoc compensation is therefore considered as not recommendable. In many cases governments have therefore established statutory compensation schemes. Existing governmental compensation schemes in some cases provide indemnification exclusively from public sources, in other schemes contributions of the livestock sector are required. The following section provides case studies from four countries, namely in Australia, the Netherlands, Vietnam and Nigeria.

3.2. Analysis of selected compensation schemes

3.2.1. Australia

3.2.1.1. Institutional framework

With the legal document referred to as *Government and Livestock Industry Cost Sharing Deed in Respect of Emergency Animal Disease Response* the Emergency Animal Disease (EAD) Response Agreement was developed, establishing the framework for a cost-sharing agreement between the government and the industry.

The government and the livestock industries in the Australian public compensation scheme are represented on two key committees. The Emergency Animal Disease National Management Group (NMG) is a high-level committee that carries responsibility for decision making on policy and resource allocation issues during an emergency animal disease response. This group comprises the secretary of the Australian Government Department of Agriculture, Fisheries and Forestry, the chief executives of all state and territorial government parties and presidents of each of the relevant livestock industry organisations. The NMG is responsible for:

- Key decisions in an Emergency Animal Disease Response Program (EADRP) including: the approval of an EADRP, the budget, and a review of an EADRP where it believes the cost may exceed the agreed limit;
- Setting an upper limit on expenditure from time to time, at a level less than the agreed limit, below which EADRP expenditure may be committed without reference to NMG;
- Determination that an Emergency Animal Disease has been eradicated or contained;

- Determination that an Emergency Animal Disease is not capable of eradication or containment by means of an EADRP; and
- Consideration of efficiency audit reports and the financial audit report.[3]

Industry and government also collaborate through the Consultative Committee on Emergency Animal Diseases (CCEAD) which is a technical advisory committee comprised of the Commonwealth and State Chief Veterinary Officers, representatives from Animal Health Australia, Biosecurity Australia, the Australian Animal Health Laboratory and industry bodies. The CCEAD is responsible for:

- Receiving formal notifications from government parties on suspected emergency animal disease incidents;
- Advising the Emergency Animal Disease National Management (NMG) if any emergency disease response is required;
- Recommending to the NMG an emergency disease response plan;
- Considering regular reports on progress of a response and develop a consensus on further actions required;
- Providing regular consolidated reports to the affected parties, and to the NMG, on the status of an EADRP;
- In circumstances where rapid eradication of an emergency animal disease is judged no longer feasible, provide advice and recommendations to the NMG on when cost sharing should no longer apply and on options for alternative arrangements;
- Determining when a disease has been controlled or eradicated under an EADRP; and
- Recommending when proof of freedom has been achieved following the successful implementation of an emergency animal disease plan.[4]

In the event of a disease outbreak, the Chief Veterinary Officer of the State or Territory produces a Response Plan and budget to manage the outbreak. When satisfied with the technical aspects of this plan, the CCEAD recommends it to the Emergency Animal Disease National Management Group. Once approved by the NMG, the Response Plan commits the affected jurisdiction to the key strategies and core operational activities. The Response Plan and the subsequent government reaction are independently audited to ascertain that it is carried out effectively and successfully. It is also possible to have a financial audit.

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[3] Adams, Ross. Presentation given 14 March 2005. Australian Department of Agriculture, Fisheries and Forestry

[4] Department of Primary Industries, Water and Environment (2003). *Emergency Animal Disease Management Plan*. Tasmania, AU. p10

3.2.1.2. Financial structure

All eligible emergency animal diseases for compensation must meet one or more of the following criteria: (1) it is a known disease that does not occur in endemic form in Australia, and for which it is considered to be in the national interest for the country to be free of the disease; (2) it is a variant form of an endemic disease, caused by a strain or type of the causal agent that can be distinguished by appropriate diagnostic methods, and if established in Australia would have a national impact; (3) it is a serious infectious disease of unknown or uncertain cause which may on the evidence available at the time, be an entirely new disease, or one not included in the categorised disease list; and (4) it is a known endemic disease, but is occurring in such a severe outbreak form, that an emergency response is required to ensure that there is neither a large scale epidemic of national significance or serious loss of market access.

At present 63 emergency animal diseases are considered for indemnification; they are classified into the 4 following disease categories which define the response to the disease in terms of proportion of government and industry funding (summarised also in Table 1):

> *Category 1 (funded 100% by the government):* These diseases predominantly and seriously affect human health and/or the environment (depletion of native fauna) but may only have minimal direct consequences to the livestock industries. This includes diseases such as rabies and Nipah virus.
>
> *Category 2 (funded 80% by the government and 20% by the applicable industry(s)):* These diseases have the potential to cause major national socio-economic consequences through very serious international trade losses, national market disruptions, and very severe production losses in the livestock industries that are involved. These diseases may have slightly lower national socio-economic consequences, but also have significant public health and/or environmental consequences. This includes diseases such as BSE, Hendra virus (formerly called equine morbillivirus), Highly Pathogenic Avian Influenza, and FMD.
>
> *Category 3 (funded 50% by the government and 50% by the applicable industry(s))*: These diseases have moderate public impact and have the potential to cause significant (but generally moderate) national socio-economic consequences through international trade losses, market disruptions involving two or more states, and severe production losses to affected industries, but have minimal or no effect on human health or the environment. This includes diseases such as classical swine fever and Newcastle disease.
>
> *Category 4 (funded 20% by the government and 80% by the applicable industry(s))*: These diseases could be classified as those that are mainly causing production losses. It is possible that there may be international trade losses and local market disruptions, but it is not typically of a magnitude that would be expected to significantly affect the national economy. The main beneficiaries of the successful emergency response to an outbreak of such a disease would be the affected livestock industry(s). This includes diseases such as Aujeszky’s disease, contagious equine metritis and equine influenza.[5]

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[5] Adams (2005), p11-13

Table 1: Australian cost sharing disease categories

Disease Category	Government Funding	Industry Funding
Category 1: very high public benefits	100%	0%
Category 2: high public benefits	80%	20%
Category 3: moderate public benefits	50%	50%
Category 4: low public benefits	20%	80%

Source: Adams, Ross. Presentation given 14 March 2005. Australian Department of Agriculture, Fisheries and Forestry.

When a disease affects more than one species of livestock, the contributions of each afflicted livestock industry are weighted according to both the gross value of production (GVP) of each industry and the importance of that particular disease for that industry; for example, compensation for losses due to FMD are allocated 50% to cattle, 30% to sheep and goats, and 20% to pigs.

When an infected animal species has financial ramifications for more than one industry, for example both the beef and dairy industries, the costs are shared on the basis of the GVP of each sector. For example, the agreed division for cattle disease is beef grazing (52.94%), beef feedlots (5.88%) and dairy (41.18%). Such arrangements also exist in sheep industries (wool and sheepmeats) and poultry industries (meat chicken and eggs).

The total amount that the affected industries are liable to pay may not collectively exceed 1% (2% for FMD) of the GVP of the industries involved. This upper limit determines the proportion affected industries pay which is then further dependent on the category of disease; for example, as affected industries are responsible for 50% of the disease costs for a *Category 3* disease, they will collectively pay half of their maximum contribution of 1% of their GVP, or a total of 0.5% of their GVP. The shares that the various state or territorial governments are liable to pay are divided proportionally (depending upon either their human population or number of animals), though in all cases the Commonwealth of Australia will fund 50% of the total government liability.

The livestock industries pay their share of the costs of a disease response through statutory industry levy arrangements or a charge based on production. In most cases, the levy is only collected when funds are needed (i.e., in the event of a disease outbreak). The industry has up to 10 years to pay back the government for their share of the costs.

3.2.1.3. Compensation

Losses eligible for compensation under this cost-sharing scheme include salaries and wages, operating expenses, capital costs, and compensation for owners of livestock. The costs of salaries and wages eligible for reimbursement include, but are not limited to: staff/consultants engaged by the party to assist directly with eradication; salaries or wages of staff/consultants engaged to backfill positions of seconded staff; allowances for staff/consultants involved in the emergency; fees and allowances to private veterinarians employed by the government parties to assist with disease operations. Operating expenses eligible for reimbursement include but are not limited to: expenses directly incurred by a party in the eradication program; internal laboratory services provided by a State/Territory government agency; external laboratory services provided for a government agency. Capital costs expenses eligible for reimbursement include, but are not limited to, essential equipment required for the immediate servicing needs of parties responding to the disease.

Owners of livestock are eligible for compensation of: (a) any livestock or property which is destroyed for the purpose of eradication or prevention of the spread of an emergency animal disease; or (b) any livestock which an inspector is satisfied has died of a proclaimed disease and that there has been no unreasonable delay in reporting the death of the livestock. Loss of profit, loss occasioned by breach of contract, loss of production and other consequential losses are not eligible for compensation.

The initial compensation payment for the animal will be indemnified according to a calculation of its value on the basis of a sale at the place where the livestock was when it was destroyed or where the livestock was when it died of the disease (farm gate value).[6] This value is determined by the earliest of the following: (1) the date the owner reports the disease or suspicion of disease to an inspector or a veterinary surgeon; (2) the date of detection of the disease by an inspector; or (3) the date of imposition of a quarantine order relating to the disease. It may be that owners are eligible to receive a second valuation, or "top-up payment", when restocking their herds if the total value of livestock on the date of release of all restrictions pertaining to the property's eligibility to be restocked is greater than the first amount paid as compensation for the livestock following the outbreak.

A claim for compensation of livestock or other property must be made by, or on behalf of, the owner within ninety days after the date of destruction or death of the livestock or other property. A request for a second valuation must be made by or on behalf of the owner within 30 days of receipt of notification that the property is eligible to be restocked. A claim for a second payment for compensation must be made within 21 days of receipt of the second valuation determination. Claims for expenditure are managed by Animal Health Australia.

3.2.1.4. Strengths and weaknesses

This scheme provides an equitable and guaranteed compensation scheme, thereby reinforcing that no party is either better or worse off than another. This creates incentives for all participants in the livestock chain to participate in prevention and immediate reporting. Since percentages for each disease is broken down into compensation by industry, animal sector and geographical location, this limits the potential for conflicting interests in the chain of production which could theoretically inhibit a satisfactory disease response.

In order to accomplish a prompt and efficient indemnification, two payments are issued: the first will indemnify the farmer on the value of the livestock on the day the disease was reported or detected, or when a quarantine was issued, which provides immediate funding for farmers; and livestock owners may later receive a "top-up" payment when they begin to restock which reimburses any difference between the new market value and the amount for which they were indemnified; thereby ensuring that livestock owners are able to completely restock their herds following a disease outbreak without running the risk that livestock holders are overcompensated.

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[6] Animal Health Australia (2002), p12

A potential weakness of this scheme is that it does not encourage complete planning reliability for farmers since levies are only collected to finance losses after an outbreak has occurred. Though farmers have 10 years to pay back the livestock industries, it could in some cases be an unexpected financial burden, depending on the amount of the losses they are responsible to reimburse.

Table 2: Main characteristics of the Australian Emergency Animal Disease Response Agreement

Name of scheme / programme	Australian Emergency Animal Disease (EAD) Response Agreement
Institutional framework / management/ governance of scheme	The government and the livestock industries are represented on two committees: (1) The Emergency Animal Disease National Management Group (NMG) which carries responsibility for decision making on policy and resource allocation issues; and (2) Consultative Committee on Emergency Animal Diseases (CCEAD) which is a technical advisory committee.
Source of funding / Cost-sharing (yes/no)	Depending on the disease categorisation, disease losses can be compensated by both government funding and the affected industry(s). Compensation is weighted according to the gross value of production (GVP) of the animal sectors involved and the production industries affected by an outbreak. The total amount that the affected industries are liable to pay may not collectively exceed 1% of the GVP of the industries involved (2% for FMD). The livestock owners contribute through industry statutory levy arrangements or a charge, often collected after an outbreak.
Diseases covered	At present 63 emergency animal disease are considered for indemnification and classified into 4 disease categories: *Category 1*: (funded 100% by the government) very high public benefits. *Category 2*: (funded 80% by the government and 20% by industry) high public benefits. *Category 3*: (funded 50% by the government and 50% by industry) moderate public benefits. *Category 4*: (funded 20% by the government and 80% by industry) low public benefits.
Compensation of livestock owners	Owners are compensated for (1) any livestock or property which is compulsory slaughtered; or (2) any livestock which has died of a disease. Consequential losses are not covered.
Compensation for other sectors	No payments for consequential losses are included in this agreement.
Compensation for government	The following costs are eligible for reimbursement: salaries and wages, operating expenses and capital costs directly incurred by a party in the eradication program; internal and external laboratory services. Consequential losses are not covered.
Compensation of smallholders	Owners are compensated for (1) any livestock or property which is compulsory slaughtered; or (2) any livestock which has died of a disease. Consequential losses are not covered.
Method of valuation	The value of livestock is based on the earliest of the following dates: (1) disease report; (2) detection; or (3) imposition of quarantine. Owners may receive a second payment if they are restocking their herds and the total value of the livestock is greater than the value for which they were initially indemnified.
Incentives provided for prevention and early reporting	- Equitable and guaranteed compensation scheme - Prompt and efficient indemnification
Documentary requirements and mode of payments	Invoices documenting costs are to be provided by affected parties to the Federal Government.
Legal basis	Government and Livestock Industry Cost Sharing Deed in Respect of Emergency Animal Disease Response

3.2.2. Netherlands

3.2.2.1. Institutional framework

A cost-sharing scheme between the Dutch government and representatives of unions of different livestock farmers and representatives of the product boards are agreed upon in negotiations, which take place every 5 years between both parties. These representatives and the Dutch government engage in formal negotiations to agree upon the costs to be shared in the event of an epidemic animal disease outbreak. The farmers and the industry are represented by the Product Boards, which exist for three sectors: livestock and meat; poultry and eggs; and dairy products. Each Product Board incorporates the whole product chain from farm to retailing and is involved in all trade and production activities within their sector. Livestock holders are represented on the Board of Governors in each Product Board.

The Ministry of Agriculture, Nature and Food is the government agency participating in these negotiations and responsible for designing the control and prevention programmes in the event of a disease outbreak. This agency administers the Animal Health Fund, which derives its legislative background from the *Gezondheids- en welzijnswet voor dieren* (Animal Health and Welfare Act). The Animal Health Fund is a financial tool used by the government for measures implemented in the event of epidemic livestock disease outbreaks such as culling, rendering, disinfection, compensation for direct losses to commercial holders and non-commercial holders and pre-emptive actions such as vaccination and prevention in case of an emergency.

In the Netherlands there is also an institutional framework to share the responsibilities for the measures. To prepare preventing or controlling measures, the ministry arranges meetings with all the organisations that have an interest or are potentially affected by an outbreak of animal disease, to discuss with them the proposals and suggestions. Based on the outcome of the consultations the policy is developed.

3.2.2.2. Financial structure

Negotiations are performed in 5-year intervals between the Product Boards and the Ministry and determine for each disease the maximum amount the Product Boards must pay in the event of an outbreak. If there is a disease outbreak and the Ministry orders controlling measures, the Animal Health Fund of the Ministry of Agriculture, Nature and Food finances costs and compensations. The Ministry subsequently invoices the relevant Product Boards, which are liable for the infected species. These Product Boards are accountable for reimbursement of the Animal Health Fund up to the pre-defined maximum amount specified in their 5-year negotiations. These amounts vary by sector and by disease. Costs and compensations relating to non-commercial holders are excluded from this and are paid fully by the government. The Product Boards have agreed to pay the following maximum amounts for specific diseases over the 2005-2009 period (the amounts yearly rise adapted to inflation and changes in the number of cattle, pigs, sheep, goats, poultry, beginning 2006):

Table 3: Maximum contribution of the related livestock sector to the Animal Health Fund

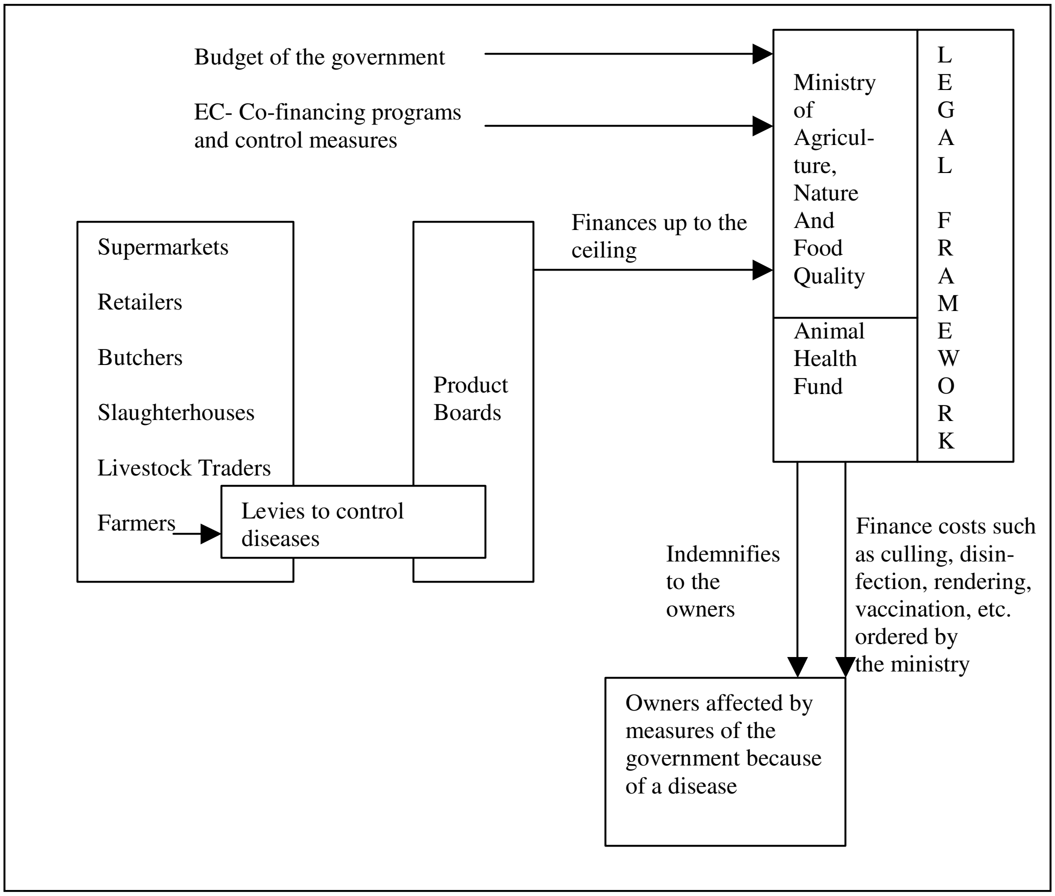
Sector (disease)	Maximum contribution of the sector (in million €)
Cattle (total diseases)	86.8
Pigs (African Swine Fever and SVD)	47.2
Pigs (Classical Swine Fever and FMD, others)	81.1
Sheep and goats (FMD, others)	3.7
Sheep and goats (Scrapies)	2.5
Poultry (Avian Influenza)	19.7
Poultry (Newcastle Disease)	2.2

Source: Questionnaire Walter Geluk (Senior policy advisor), questionnaire to Ministry of Agriculture, Nature and Food Quality of the Netherlands, updated figures for 2006

The Product Boards fund their financial responsibility initially with their reserves and/or a bank guarantee and subsequently, via levies to livestock owners in their sector. These levies, defined on a yearly basis by the industry representatives themselves, are differentiated by livestock species, age, utilisation, product, and production system. The Product Boards calculate the levies livestock owners must contribute; this figure takes into consideration the account of indemnifications from previous years that have to be refinanced and the level of reserves that has to be built up for future epidemics. The levies are differentiated and proportionally paid according to the animals' age or to the production. Any costs of the disease over this maximum amount is paid in full by the Dutch government, part of which is reimbursed from the EU's "Veterinary Fund", which maintains a system of co-financing losses caused by major disease outbreaks. Irrespective of the maximum contribution of the Product Boards to the Fund, costs of monitoring diseases are paid 50:50 by both the government and the Product Boards.

The public compensation scheme in the Netherlands is illustrated in Figure 1:

Figure 1: The Netherlands' compensation scheme with public involvement


Budget of the government
EC- Co-financing programs and control measures
Ministry of Agricul-ture, Nature And Food Quality
Animal Health Fund
LEGAL FRAMEWORK
Supermarkets
Retailers
Butchers
Slaughterhouses
Livestock Traders
Farmers
Levies to control diseases
Product Boards
Finances up to the ceiling
Indemnifies to the owners
Finance costs such as culling, disin-fection, rendering, vaccination, etc. ordered by the ministry
Owners affected by measures of the government because of a disease

Source: Civic Consulting / Ministry of Agriculture, Nature and Food Quality of the Netherlands

3.2.2.3. Compensation

Livestock owners are compensated under this cost-sharing scheme for major epidemics such as Avian Influenza, FMD, BSE, Swine fever, Newcastle Disease, Bovine tuberculosis, Brucellosis, Rinderpest and Scrapies (diseases specifically not covered include Aujeszky's disease, IBR, Johne's disease and Salmonella).

In the event of an outbreak of a relevant disease, livestock owners are compensated for the destruction of animals, eggs, milk, feed, and other materials. Direct losses of non-commercial livestock owners, who are not members of the Product Boards, are covered entirely by the Ministry in order to promote reporting of the disease. Consequential losses are not eligible for reimbursement under this scheme.

The Animal Health Fund also reimburses costs involved in monitoring and eradication measures of the Ministry such as culling, rendering, disinfection, and preventive actions such as vaccination in case of an emergency and any additional costs that accrue to the Ministry. Additionally, veterinarians are also liable for compensation when they have visited an infected farm and therefore, by order of the Ministry, are banned from visiting other farms within the following 72 hours.

Compensating for livestock owners and smallholders is derived from the market value for the livestock before the epidemic outbreak, or the equivalent if market values are not available. The pre-epidemic value of the livestock is differentiated by category of animal and age and is based on purchasing price plus the costs for feed and housing. The Ministry decides on the final amount of the compensation payment. These compensation payments reimburse livestock owners' total loss of value, which is calculated by independent evaluators and based on the appraisal from the government veterinarian who conducts the initial inspection after the disease is first reported. At the time of inspection, healthy animals, which are culled, are indemnified at 100% of the market value, visible sick animals are indemnified at 50%, and animals that have already died are not indemnified at all.

3.2.2.4. Strengths and weaknesses

This scheme gives high financial responsibility to members of the production chain. Payment is conditional on the health of the animals, which is ascertained by the veterinarian's first visit to farm. This is to encourage early reporting and incentives to take preventive measures on the farm, as the financial consequences are severe for livestock owners with infected farms. Economic sanctions are also imposed if there is proof that an outbreak is the fault of the livestock owner when, for example, certain hygiene or sanitary conditions have not been met on the farm.

This compensation scheme provides high incentives for livestock owners to take preventive measures, except when the livestock owner does not intend to continue production following an epidemic disease outbreak. Livestock owners who expect to abandon production altogether after an outbreak do not have any incentives to avoid epidemics, except quasi-deductibles (reduced indemnification for sick or dead animals) and consequential losses, because they do not pay levies after the outbreak.

Under this scheme, levies are not differentiated among farmers or regions. Thus, levies do not reflect the risks of individual farmers and therefore may not affect risk management planning of individual farmers. But, as the Dutch Ministry pointed out, because of the risk of direct and consequential losses and the higher levies, farmers have and will take preventive measures voluntarily.

Also, the incentives for the producers and for the government may be liable to change when the ceiling of compensation by the Product Boards is reached. Above the ceiling the producers do not bear any of the direct costs of the measures to combat an outbreak. However, each producer still bears his own consequential losses.

Table 4: Main characteristics of the Dutch Animal Health Fund

Name of scheme / programme	Animal Health Fund
Institutional framework / management/ governance of scheme	The Ministry of Agriculture, Nature and Food is responsible for designing the control and prevention programmes in the event of a disease outbreak. Funding issues are based on formal negotiations between farmer representatives and representatives of the Product Boards and the Dutch Ministry of Agriculture, Nature, and Food.
Source of funding / Cost-sharing (yes/no)	Negotiations between the Product Boards and the Ministry determine for each specie / disease the maximum amount the Product Boards must pay in the event of an outbreak. Immediately after a disease outbreak, costs are financed by the Animal Health Fund of the Ministry of Agriculture, Nature and Food. The Ministry subsequently invoices the relevant Product Board. These Product Boards are accountable for reimbursement of the Animal Health Fund up to the pre-defined maximum amount specified in their negotiations. The Product Boards fund their financial responsibility via levies to livestock owners in their sector. Any costs of the disease over this maximum amount is paid in full by the Dutch government, part of which is reimbursed from the EU's "Veterinary Fund", which maintains a system of co-financing losses caused by major disease outbreaks.
Diseases covered	Major epidemics such as Avian Influenza, FMD, BSE, Swine fever, Newcastle Disease, Bovine tuberculosis, Brucellosis, Rinderpest and Scrapies.
Compensation of livestock owners	Livestock owners are compensated for the destruction of animals, eggs, milk, feed, and other materials. Consequential losses are not indemnified.
Compensation for other sectors	Veterinarians banned from visiting other farms within 72 hours after having been on an infected farm by order of the Ministry are indemnified.
Compensation for government	Costs involved in monitoring and eradication measures of the Ministry such as culling, rendering, disinfection, and preventive actions such as vaccination in case of an emergency and any additional costs that accrue to the Ministry.
Compensation of smallholders	The government fully bears the costs of compensating all direct losses for non-commercial holders. Consequential losses are not indemnified.
Method of valuation	The basis for compensating livestock owners and smallholders is the market value for the livestock before the epidemic outbreak or the equivalent if market values are not available. The pre-epidemic value of the livestock is differentiated by category of animal and age and is based on purchasing price plus the costs for feed and housing. Healthy animals at the time of inspection that are culled are indemnified at 100% of the market value, visible sick animals are indemnified at 50%, and animals which have already died are not indemnified at all.
Incentives provided for prevention and early reporting	This scheme gives high financial responsibility to members of the production chain. A reduced compensation conditional on the health of the livestock encourages early reporting and preventive incentives on the farm.
Documentary requirements	The final amount of the compensation payment is based on the appraisal from the government veterinarian.
Time frame for reimbursement	Boards have to pay at first call of the government
Legal basis	*Gezondheids- en welzijnswet voor dieren* (Animal Health and Welfare Act)

3.2.3. Vietnam

3.2.3.1. Institutional framework

The Vietnamese government established the National Prevention/Emergency Fund to control and prevent risks such as natural damage, epidemic livestock disease, and human disease outbreaks in the country. The first Highly Pathogenic Avian Influenza outbreak occurred in Vietnam in December 2003. AI poses a threat to Vietnam in two critical areas: (i) public health, given the zoonotic potential of the disease, and (ii) production, given the importance of the poultry sector for the domestic economy. In addition to these two critical areas, the poverty reduction potential of small-scale poultry production for rural smallholders needs to be kept in mind.

Considering the above factors, the Government of Vietnam (GoV) established an emergency support policy to contain the AI outbreak. Government decision No 396/QD-TTg on compensation was approved on April 20, 2004. In order to contain disease spread, the GoV's policies had to balance the potential consequences of decisions taken, while constructing a long-term sustainable strategy to contain future outbreaks. The Vietnamese Ministry of Agriculture and Rural Development (MARD) thus sought to improve the compensation policy implemented after the AI outbreak. The 2004 policy was elaborated and implemented under the pressures surrounding the AI emergency outbreak situation and therefore needed to be refined and adapted, not only to meet farmer's needs but also to address economic constraints arising at governmental level.

Based on a study by international and national consultants in 2005, government decisions No 574/QD-TTg (24/06/2005) and No 309/2005/QD-TTg (26/11/2005) on compensation policy were approved. The policies aim at preventing the public health threat derived from AI, as well as reducing the economic losses at national level associated to the outbreak. The policy rationale is to encourage farmers to declare the disease at an early stage to contain the disease spread among the poultry population. A key component of the support policy is a level of compensation that encourages farmers to cull animals rather than selling them illegally on the market.

There is an ongoing debate about adequate risk-sharing patterns between the public central government funds and poultry producers. Such patterns are closely related to the restructuring of the poultry production sector in Vietnam. The MARD is the government agency participating in these negotiations and responsible for designing the control and prevention programmes in the event of a disease outbreak. The National Committee for Avian Influenza Disease Control and Prevention (NCAI)[7] advises the GoV on the support policy, and on control and prevention strategies for AI. The National Prevention/Emergency Fund and the local Prevention/Emergency budget have been used to allocate support for containing AI outbreaks, such as direct compensation for poultry culled, restocking subsidies and coverage of other expenses.

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[7] Chaired by the Minister of MARD, with the Vice Ministers of MARD and Ministry of Health (MOH) as vice chairmen, the official members of the committee are the representatives of the Ministry of Finance, Ministry of Trade, Ministry of Police, Ministry of Transport, Ministry of Natural Resources and Environment, Ministry of Culture and Information, and Ministry of Foreign Affairs. The Department of Animal Health (DAH) in MARD and the Department of Preventive Medicine in MOH are also formal members.

3.2.3.2. Financial structure

The National Prevention/Emergency Fund, which is generated through national taxes, is used in the case of national emergencies.

Currently, the Vietnamese Government faces two epidemic livestock diseases, namely Foot-and-Mouth Disease (FMD) and AI. In case of these diseases, the main principles guiding compensation for poultry and livestock producers who have poultry and livestock culled in the cases of AI and FMD are following[8]:

(i) The government contributes 50 percent of the costs for controlling the diseases. The remaining amount is contributed from provincial Prevention/Emergency budgets.

(ii) Ha Noi and Ho Chi Minh City do not receive any contribution from the central government, the budget will come from their local Prevention/Emergency budgets.

(iii) In cities and provinces where the contribution towards FMD and AI control exceeds 50% of the local Prevention/Emergency budget, the central government contributes the difference from the National Prevention/Emergency Fund.

(iv) The National Prevention/Emergency Fund supports all the costs for controlling the diseases for provinces which have been just established.

In the case of AI, the Vietnamese Government reacted with considerable effort to contain the outbreak once the scope and ferocity of the epidemic became apparent. It established a multi-ministerial AI steering committee (AIST), which is chaired by the Ministry of Agriculture and Rural Development, and comprises representatives of the ministries of Agriculture and Rural Development, Health, Finance, Planning and Investment, as well as other departments. A national action plan for the control of AI was drafted to provide guidelines for containing the epidemic. It was to be implemented by the AI working group, comprising the various technical animal husbandry and animal health institutes.

The budgets of the National Prevention/Emergency Fund and the provincial Prevention/Emergency budgets are financial tools for compensation. At the start of the AI outbreak, the Vietnamese government decided to provide a budget for the control of AI and recovery of the poultry production sector of 245.316 billion VND (15.1 million US$)[9]. This amount was subsequently increased by government decision No 906/QD-TTg (16/08/2004) by 22.675 billion VND (1.3 million US$).

Until March 2005, total central government budget allocated for AI was of 267.991 billion VND (16.4 million US$). On November 15th 2005, the Prime Minister signed decision number 1239/QDD-TTg to allocate an additional budget of VND 1,306.4 billion (81.5 million US$) for the 2005-2006 period to prevent and control the influenza pandemic. 85 percent of this budget was allocated to the central level (ministries, regional institutes), and the rest of the funding was allocated to 59 provinces and cities.

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[8] According to government decision No 396/QD-TTg - 20/04/2004; government decision No 574/QD-TTg-24/06/2005; government decision No 309/2005/QD-TTg-26/11/2005; government decision No 738/QD–TTg–18/5/2006 and government circular No 44/2006/TT–BC–24/5/2006.

[9] Exchange rate at 1USD = 16000 VND

The key points of the central government's emergency policy guidelines on AI fund allocation and subsidy levels can be grouped into two categories: (i) funding for poultry producers (i.e. households, farmers, cooperatives, etc.); and (ii) funding for State Owned Enterprises (SOE).

Compensation funding from the National Prevention/Emergency Fund for poultry producers is dependent on the budget department of the Ministry of Finance, while compensation for State Owned Enterprises depends on the Department of National Enterprises of the Ministry. Compensation funding is shared equally between the central and provincial contingency budgets but the level of compensation differs considerably from province to province, depending on the income level.[10]

The case of Ho Chi Minh city is interesting when focusing on the management of financial resources during the AI outbreak. As opposed to other provinces, the department of finance of HCM allocates an amount of funds to the sub-department of animal health (SDAH). Subsequently, it is the SDAH that is in charge of allocating funds to the necessary activities to control and compensate the AI outbreak. This procedure sheds light on a new form of financial management at the provincial level. Although SDAH members mentioned that the allocation of funds through SDAH increases their workload, this financial organisation has the potential to allow the department to prioritise and allocate resources to animal health in a more accurate and efficient way, thus increasing responsiveness and reducing administrative tasks.

The allocation of funds in the provinces followed a different pattern, characterised by a control of the financial resources by the financial department (DF) at the provincial and district levels. Thus, the provincial DF allocated funds to the district DF, which in turn distributed the money to farmers in accordance to the previously specified number of animals culled. Contrarily to the case of Ho Chi Minh city, the sub-department of animal health was not involved in the fund allocation process in the provinces.

3.2.3.3. Compensation for private poultry producers

Following the recommendation of a study on compensation and related financial support to farmers, the government's compensation for birds culled during the stamping-out of outbreaks was raised from 10-15 percent of the market value of the poultry slaughtered in 2004 to 50 percent in June 2005 (VND 15,000 per bird). Increasing compensation level results in greater satisfaction of the farmers.[11] As mentioned previously, the compensation policy differs from private poultry producers to State Owned Enterprises.[12]

The main guidelines for compensation to private poultry producers from the central government were the following:

- Direct subsidy of 5,000 VND/head (0.32 US$) of poultry culled. From June 24 2005, this subsidy increased to 15,000 VND/head (0.94 US$) for poultry the farmer was forced to cull or culled voluntarily because of infection by the disease. From November 26, 2005, this subsidy was of 10,000 VND/head (0.6 US$) for poultry culled voluntarily. Provinces were able to increase the subsidy level through their local contingency funds.

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[10] Riviere-Cinnamon et al. (2005)

[11] Personal communication with Nguyen Anh Tuan, Department of Livestock Production, MARD, directly responsible for AI control and prevention project in Vietnam.

[12] Government decision No 396/QD-TTg, 2004; government decision No 574/QD-TTg, 2005 and government decision No 309/2005/QD-TTg, 2005

- Restocking subsidy of 2,000 VND/head (0.13 US$) was offered to recover poultry production. The amount given was directly related to the number of animals culled. This subsidy ended at the end of 2004.

- Other direct expenditures (i.e. equipment, facilities, disinfectants, protective clothing, staff in quarantine stations etc.) were financed by the central government budget at a rate of 3,000 VND/head (0.19 US$) of poultry culled for control of AI during and after the outbreak.

Poultry producers' losses were calculated at local level in relation to the number of animals culled per category. Categorisation and related compensation, however, differs greatly between the provinces.[13] For example, Ho Chi Minh City province divided poultry into 10 categories for different compensation levels, An Giang and Ha Tay Provinces divided poultry into 4 categories and Tien Giang province established 3 categories.

Contrary to the national policy on risk sharing in relation to AI (i.e. 50% financing from both the central government and the provinces), the actual percentage contributed by some provincial authorities was far below the suggested levels. It was however stated in the national policy document[14] that the provinces more heavily affected by the outbreak would receive a higher level of compensation. A study shows that the contribution share was of 11% for Tien Giang province and of 8% for An Giang, thus far below the 50% level envisaged for the provinces. The contribution from their respective Province Prevention Fund (PPF) was of 14% and 10%. On the contrary, Ha Tay province contributed 48% of the total amount spent on the AI crisis in the province, and its contribution from the PPF was 16%.

There are also differences regarding the policy of farmers' eligibility for compensation at the province level. The decision to compensate all farmers was made in the case of Ha Tay province, but some of the provinces did not compensate all farmers. Only poultry producers of over 100 animals were compensated in Ho Chi Minh, while to receive compensation in Tien Giang, production had to be above 50 animals. The number of animals culled was not explicitly described, as it was the case in An Giang province.[15]

3.2.3.4. Compensation for State Owned Enterprises

Vietnam currently possesses 12 Grand Parent (GP) SOE farms.[16] This category received the total amount of funds needed to feed the foundation stock; to restock and to ensure veterinary activities; disinfections; costs of labour; equipment, etc, from the central government. The funds were given to the sub-departments of animal health (SDAH, at the provincial level) for veterinary activities. SDAH then allocated funds to each farm in relation to needs, and a part of the fund was allocated for disinfecting activities.[17]

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[13] Riviere-Cinnamond et al (2005) and Ana Riviere-Cinnamond "Support policy strategy for avian influenza emergency recovery and rehabilitation of the poultry sector in Vietnam", MARD conference on 28th March 2005, Hanoi, Vietnam

[14] GoV-No 396/QD-TTg

[15] Riviere-Cinnamond (2005)

[16] Data from Department of Livestock Production - MARD

3.2.3.5. Method of evaluation

At the provincial and district levels, AI Committees for Avian Influenza Disease Control and Prevention are established by the official members of the committee, who are representatives of the sub-departments of Agriculture, Health, Animal Health, Finance, Trade, Police, Transport, Natural Resources and Environment, and Culture and Information, at different levels. At commune and village levels, the commune AI control committees supervise the control of animal movement, culling and disposal.

These commune committees comprise a commune leader, a lawyer, an animal health worker, a sample of affected farmers, a police officer and other personnel and individuals. Evaluation of losses is done at the local level. As an outbreak occurs, farmers should inform the head of the village. In turn, the head of the village should report to the communal committee for Avian Influenza Disease Control and Prevention. This communal committee in turn informs the AI committees for Avian Influenza Disease Control and Prevention at the provincial and district levels. These committees visit the stock and carry out tests to confirm the AI infection of the stock. When the result is positive, all of the poultry in the infected area is be culled. A culling document/appraisal form, which includes information on the date the owner reports the disease, the date of detection of the disease by an inspector, the date of culling, the number of poultry culled and the category of poultry, is then made and singed by farmers and representative members. Compensation to farmers is based on this document. Compensation is paid through the commune institution. The procedure is as follows: funds from the central government are allocated through the financial department (DF) at the provincial level. Then the financial department at the provincial level allocates the central government funds together with the provincial fund to the district financial department. The district financial department allocates the total compensation payment to the communes, which in turn distribute the money to farmers in accordance to the previously specified number of animals culled. All payment is made in cash.[18]

3.2.3.6. Timeframe for disbursement of funds

Responsiveness to needs during the AI outbreak was closely related to the timeframe in which funds were disbursed. Central government funds were distributed to producers both during and at the end of the outbreak, while farmers only received funds for restocking at the end of the outbreak. However, provinces advanced funds from their respective provincial prevention funds before receiving central government contributions, which allowed them to take the first preventive measures against AI.

As opposed to the disbursement of compensation funds to the poultry producers, calculation and disbursement of compensation funds for SOE were performed at the end of the outbreak only. There were no advance funds from central government.

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[17] Riviere-Cinnamond et al. (2005)

[18] Personal communication with Mr Tuan, MARD and MOH. 2006; World Bank (2004)

3.2.3.7. Strengths and Weaknesses

Payment of this scheme is conditional on the health of the animals, which is ascertained by the first visit of the Committees for Avian Influenza Disease Control and Prevention to the stock. This is to encourage early reporting and incentives to take preventive measures on the farm, as financial consequences for a farmer with infected stock are important. Producers will thus be more willing to declare the disease at an early stage and cull their animals, reducing animal movement and illegal selling. Following this rationale, the AI outbreak is expected to be contained at a much earlier stage, hence reducing indirect costs and losses. This contributes to quick control of AI. The compensation policy reduces financial difficulties for farmers when infected poultry dies and when infected products are banned from being sold in the market.[19]

However, problems arise from the establishment of different categories and especially different compensation rates between provinces. For instance, farmers try to move and cull their poultry in neighbouring provinces, where support received and compensation rates are higher. Differing compensation rates and categories between provinces encourage animal movement, thus enhancing disease spread and hindering rapid disease containment.

The rationale behind compensating farmers is to increase compliance with regard to animal culling, and is therefore crucial in the containment of and AI outbreak. If the farmers are not compensated because they own only a small amount of poultry, there would be an incentive for them to sell potentially infected animals in the market, thus contributing to the spread of the disease.

Furthermore, late payment and unsatisfying compensation rates for farmers could encourage them to illegally move and sell their animals in order to minimise their share of losses and to not report when their poultry is infected, impeding rapid containment of the outbreak.[20]

Table 5: Main characteristics of the Vietnamese Compensation Scheme

Name of scheme / programme	Compensation/support policies for Prevention and Control of Highly Pathogenic diseases.
Institutional framework / management/governance of scheme (role of government/private sector)	The Ministry of Agriculture and rural Development is responsible for designing the control and prevention programmes in the event of a disease outbreak. A multi-ministerial AT steering committee (AIST), chaired by the Ministry of Agriculture and Rural Development, and compromising representatives of the ministries of Agriculture and Rural Development, Health, Finance, Planning and Investment, as well as other departments, negotiate a compensation/support plan.

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[19] Son, N. T. (2007). Enhancing HPAI Control through compensation policy – Vietnam case. World Bank conference on 13th February, 2007

[20] Personal communication with Son,Tuan (2007)

Source of funding / Cost-sharing (yes/no)	The government supports 50 percent of the costs for controlling the diseases. The remaining level of risk sharing comes from provincial funds. Ha Noi and Ho Chi Minh City do not receive any contribution from the central government. Compensation from governmental budget is homogeneous across categories but provinces divide poultry into different categories for compensation. The level of compensation therefore differs considerably from province to province, depending on the income level of the province. The allocation of funds is mainly characterised by a control of the financial resources by the financial department (DF) at the provincial and district levels. Thus, DF at the provincial level allocated funds to the district DF, which in turn distributed the money to farmers in relation to the previously specified number of animals culled.
Diseases covered	Major livestock epidemics such as Avian influenza, Foot-and-Mouth disease.
Compensation of livestock owners	Owners are compensated for (i) livestock that is compulsory and willing slaughtered; or (ii) recovery of poultry production by restocking in 2004. The amount released was directly related to the number of animals culled. Consequential losses are not covered.
Compensation for government	Costs involved in monitoring and eradication measures of the Ministry such as culling, rendering, disinfecting and preventive action such as vaccination, internal and external laboratory services. Consequential losses are not covered.
Compensation of smallholders	Owners are compensated for (i) livestock that is compulsory and willingly slaughtered; or (ii) recovery of poultry production by restocking in 2004. The amount released was directly related to the number of animals culled. Consequential losses are not covered.
Method of valuation	Compensation of livestock producer is based on the value of livestock in the market before the epidemic outbreak. Poultry culled is indemnified at 10-15 percent of the market value in 2004, an amount that was raised to 50 percent in June 2005. Livestock culled because of FMD is indemnified at 50 percent of the market value.
Incentives provided for prevention and early reporting	Payment of this scheme is conditional on the health of the animals in order to encourage early reporting and incentives to take preventive measures on farms. The compensation policy reduces financial difficulties for farmers, hence their prevention and early reporting is voluntary, impeding a rapid spread of the outbreak.
Documentary requirements and mode of payments (loss assessment)	The final amount of the compensation payment is based on the appraisal from the AI committee at the village and commune levels.
Time frame for reimbursement	Disbursement of central government funds for poultry producers took place during and at the end of the outbreak. Funds allocated for restocking were only distributed at the end of the outbreak. Disbursement of compensation funds for SOE was performed at the end of the outbreak.
Legal basis	Compensation/support policies for Prevention and Control of Highly Pathogenic Avian Influenza in Vietnam were approved by the Vietnamese government (government decision No 396/QD-TTg, 2004; government decision No 574/QD-TTg, 2005 and government decision No 309/2005/QD-TTg, 2005). Compensation/support policies for Prevention and Control of food and mouth disease in Vietnam was approved by the Vietnamese government (Government decision No 738/QD – TTg, 2006 and government circular No 44/2006/TT – BC, 2006)

3.2.4. Nigeria

Nigeria does not have a comprehensive scheme for compensation in the event of animal disease outbreaks, although there is a history of compensation payments to livestock owners to compensate producers in cases where animals are culled for disease control purposes. Thus it is reported that in the past the Northern Nigerian Government had an apparently successful scheme to compensate cattle owners whose animals were slaughtered in order to contain Contagious Bovine Pleuropneumonia (CBPP).

National policy for control of Avian Influenza was control by stamping-out of infected farms with payment of compensation for birds culled; while vaccination was excluded. The rudiments of a government-funded (US$ 847,558 since 2003) compensation scheme were put in place in March 2006 compensating farmers at 30-50% of the market value. According to the WB/AICP Compensation Plan, compensation rates in Naira ($1 = 127 Naira) are the following: Ostrich N20,000; Emus N10,000; Turkey N2,500; Duck N1,000; Goose N1,000; Chicken N250. Total paid to date is N161 million. It was, however noted at the time that: "The existing veterinary law provides for the establishment of a compensation fund, but no steps have been taken as yet to develop the required implementation arrangements, including financing, fiduciary aspects, eligibility criteria, payment arrangements, flow of funds, etc."[21] It was also noted that it would be a condition for the disbursement of funds that there be specific and transparent rules and regulations on: (a) the actual mobilization of the needed financing, notably as regards cost sharing by livestock owners; (b) the intermediate disposition of such funds until they are actually needed; (c) the procedural steps required to trigger actual compensation payments; and (d) the administrative and payment arrangements in the event of an authorized case of compensation. In addition precise guidelines were sought for: (i) establishing and verifying compensation claims; (ii) determining the amount of compensation per animal; (iii) recording and reporting stamping out and compensation claims; (iv) actual payment to legitimate beneficiaries; and (v) monitoring payments. It is understood that while some of these points were addressed via a compensation manual, it lacked the necessary degree of specificity.

The general lack of adequate preparedness was confirmed by a mission carried out by FAO, OIE and AU IBAR in Nigeria in October 2006 which indicated that the State Veterinary Services capacity were not prepared to handle this disease emergency due to years of inadequate investment in Veterinary Services and a weakened central veterinary authority. Control activities were also complicated further by inability to mobilise compensation rapidly, so many farmers were poorly compensated because by the time the decision to cull was taken a significant proportion of poultry had already died from the infection and were ineligible for compensation. It also appears that while there was a rapid response committee set up at Federal level under the auspices of the Ministry of Agriculture no similar structures existed at State level. This, combined with the fact that the funds were held at Federal level, compounded the difficulties faced when the outbreak occurred.[22]

In addition, it was noted by Dr. M.D. Sa'idu, the Chief Veterinary Officer, at a seminar in December 2006[23] that "there were some attempts by some farmers to conceal the disease as they consider the flat rate compensation mechanism not attractive enough". This also led to "sale of birds to unsuspecting members of the public" which contributed the spread of the disease and attendant human exposure. It was also noted that there were “delays experienced in settling of compensation claims” and that subsistence owners insisted “on being paid outright cash before their birds are culled”.

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[21] World Bank (2006b)

[22] Personal communication with the Delegation of the European Union to the Federal Republic of Nigeria, February 2007

[23] AHI Seminar on Compensation Issues: Nigeria's experience with compensation, December 2006

In conclusion it was noted that there was a need for timely payments, a sustainable compensation fund, better determination of the values to be compensated for and regular review of compensation rates to ensure these remain in line with economic realities. It is understood that currently the institutional structures and the compensation manual are in the process of revision and on 20 February 2007 it was announced that compensation rates for chickens had been doubled to 500 Naira per bird.[24] It is understood that this follows a renewed outbreak of Avian Influenza in the northern state of Bauchi and the first confirmed human death from the H5 N1 virus.

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[24] Agence France Presse, ‘Nigeria doubles health flu compensation for farmers’, 21 February 2007, Dr Martin M’bonu

4. Experiences of selected global funds for developing and transition countries

4.1. Introduction

There is a large variety of global funds that provide financing for specific causes, focusing e.g. on emergency assistance, disease prevention or environmental programmes. This section analyses a total of five of such funds with respect to their financial, technical and operational characteristics. The following funds have been analysed: The UN Central Emergency Response Fund (CERF); the Global Fund to Fight AIDS, Tuberculosis and Malaria; the WFP Working Capital Financing Facility; the OIE World Animal Health and Welfare Fund; and the FAO Special Fund for Emergency and Rehabilitation Activities (SFERA). The results of the analysis have been a basis for developing operational principles for a possible Global Emergency Response Fund for Animal Epizootics and Zoonoses.

4.2. Analysis of selected global funds

4.2.1. UN Central Emergency Response Fund

The former Central Emergency Revolving Fund was upgraded into the Central Emergency Response Fund (CERF) by the UN General Assembly's adoption of Resolution A/RES/60/124 at 15 December 2005. The launch of CERF took place at 9 March 2006. The UN Emergency Relief Coordinator (ERC) John Holmes manages the Fund on behalf of the UN Secretary General.

The purpose of the new CERF is life saving intervention, which is defined in its three objectives;

- Promote early action and response to save lives;
- Enhance response to time-crucial requirements based on demonstrable needs;
- Strengthen core elements of humanitarian response in under-funded crisis.[25]

The focus on life-saving interventions implies that the fund does not cover pure prevention and/or preparedness activities. However distinct elements of some projects, such as in the area of health and animal health, may also cover preventive actions. Prevention and/or preparedness activities are only carried out in combination with rapid response, life-saving activities.[26]

The total capital of pledged and contributed monies for 2006 lies at US$ 300 million. Of this US$ 1.1 million has been pledged and US$ 299 million has been actually paid into the Fund.[27] US$ 343 million has been pledged so far for 2007, with US$ 40 million already transferred as of 27 January 2007. In 2006, 70% of all funds went to Africa.

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[25] United Nations Office for the Coordination of Humanitarian Affairs (2006), The Central Emergency Response Fund (CERF). Retrieved December 21, 2006, from http://ochaonline.un.org/webpage.asp?Site=cerf

[26] Interview UN CERF

[27] CERF (2006, December 13). List of Pledges and Contributions in 2006

4.2.1.1. Mobilisation of funding

Governments, private organisations and individuals can all donate into CERF.[28] The majority of contributions come from governments, with less than 1% of the contributions coming from corporations, individuals and others.[29]

In 2006, 54 governments had donated to the fund, with the main contributors being the UK, the Nordic countries and the Netherlands. Some potential recipient countries have made symbolic contributions, such as Pakistan, Nigeria and Trinidad and Tobago.[30] Pledges for 2007 are from 68 governments and three private sector organizations. There is also an on-line giving facility for individuals managed by the UN Foundation, which is accessible through the CERF website.

To prevent the Fund from drying up in case of large-scale, or numerous emergencies, the UN Emergency Relief Coordinator decided to maintain a minimum balance of $30 million, the maximum allocation under the rapid response window, as a reserve.[31]

4.2.1.2. Intervention rules

CERF consists of a loan and a grant element. The loan facility includes US$ 50 million, the grant facility includes up to US$ 450 million. The United Nations, its funds, programmes and specialized agencies, as well as the International Organization for Migration, are eligible to apply for funds.[32] As Fund manager, OCHA is not eligible for the grant element of the fund, only for the loan element.

In order to be eligible for a grant, at least one of the three CERF objectives, as listed in the introduction above, need to be fulfilled. There are three sorts of grants, (a) Rapid Response for Sudden Onset Crises; (b) Rapid Response for Time Critical Requirements; and (c) Under-funded Emergencies.[33] The rapid response grants address the first two of the mentioned CERF objectives; the under-funded emergency grants the third.[34] Funds received by grantees for rapid response must be committed within three months.

The CERF loan facility provides funds to allow recipients to initiate activities as soon as a donor has made a firm pledge for support. The organisation then repays the advance to CERF on receipt of the related donor funds. The use of CERF funds thus allows early action provided a donor has pledged financial support.

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[28] CERF (2006). How to donate. Retrieved December 21, 2006, from http://ochaonline2.un.org/Default.aspx?tabid=7484

[29] Based on calculation of CERF (2006, December 13). List of Pledges and Contributions in 2006

[30] Interview. CERF (2006, December 13). List of Pledges and Contributions 2006

[31] ECOSOC (2006, September 14). Report, p3

[32] UN Secretariat (2006, October 10). Bulletin, p2

[33] United Nations Office for the Coordination of Humanitarian Affairs (2006, July 31). Guidelines Central Emergency Response Fund (CERF): Grant Component, p3

[34] Central Emergency Response Fund (2006, December 5). Fact Sheet, p1

Subject to availability, normally a maximum of US$ 30 million shall be applied to rapid response grants. Grants for under-funded emergencies are not subject to per country or per emergency limits. Instead, grants for under-funded emergencies are made based on the overall level of life-saving humanitarian needs not covered by donors.[35]

A formal appeal for the CERF rapid response grant element is typically field-driven and is initiated by the United Nations Resident Coordinator or Humanitarian Coordinator. The Resident Coordinator or Humanitarian Coordinator analyses the demonstrable or assessed needs for the rapid response in consultation with the Inter-Agency Committee Country Team. Preferably the Inter-Agency Country Team is extended in order to include all leading NGOs. National authorities are consulted as appropriate. Together a detailed list of priority life saving needs according to CERF criteria are prepared, including the:

1. Cause of the situation;
2. Number of people affected;
3. Description of humanitarian indicators and indications of any rapid deteriorations thereof;
4. Displacement figures (new displacements);
5. Implications if needs are not met;
6. Indicative budget (if available); and
7. Review of fund-raising efforts to date.

At the same time the Emergency Relief Coordinator may take on a proactive role, by alerting Resident Coordinator or Humanitarian Coordinator when use of CERF may be appropriate and about the analysis of needs with the Inter-Agency Committee Country Team.[36] Eligible humanitarian organizations, i.e. UN organizations and the International Organisation for Migration, draft grant applications on basis of the established list of priority needs. Applications for CERF rapid response grants need to be made through the Resident Coordinator or Humanitarian Coordinator, and all proposals must be endorsed by the relevant Resident Coordinator or Humanitarian Coordinator.

The CERF rejects proposals on base of criteria set for the fund (i.e. life-saving/core emergency humanitarian needs). Sectoral activities typically considered “life-saving” as per the CERF criteria are: food, health, protection, security, shelter/NFI, water and sanitation, multi-sector, and emergency education. However, the Resident/Humanitarian Coordinator may also make a case for activities from other sectors, by explaining why a particular activity is life-saving in the context under his/her jurisdiction. For example, Humanitarian/Resident Coordinators in Africa have successfully made the case for inclusion of agricultural activities as key life-saving activities for food security.

Another ground for rejecting proposals is when money from other sources is already available. An example of this was flooding in Suriname. An application was made for grant funding, however pledges had been already made. CERF then recommended drawing on the loan element. The loan element is used as a cash-flow mechanism. In 2006, US$ 30 million was provided in loans.[37]

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[35] Interview with UN CERF

[36] United Nations Office for the Coordination of Humanitarian Affairs (2006, July 31). Guidelines Central Emergency Response Fund (CERF): Grant Component, p5

In the table below an overview is given on the distribution of sectors CERF paid in 2006 during the period March 1 to December 21.

Table 6: CERF funding by sector (2006) – summary

Sector	Funds Disbursed US$	Percentage of Total
Food	48,091,823	27.57 %
Health	40,337,101	23.12 %
Multi-sector	30,715,357	17.61 %
Coordination and support services	24,616,943	14.11 %
Water and sanitation	12,073,275	6.92 %
Agriculture	9,894,042	5.67 %
Protection/Human Rights/Rule of Law	3,717,128	2.13 %
Shelter and non-food items	3,142,828	1.80 %
Education	1,036,718	0.59 %
Mine Action	516,800	0.30 %
Other	299,300	0.17 %
Total	**174,441,315**	**100 %**

Source: CERF (2006). CERF in Action. Retrieved at December 18, 2006, from: http://ochaonline2.un.org/Default.aspx?tabid=8879

Once a loan or a grant has been approved by the Emergency Relief Coordinator, it will be sent to the HC/RC (Resident Coordinator or Humanitarian Coordinator) and to the relevant Agency an approval letter and a draft letter of understanding (LoU) to be signed by an authorized representative of the recipient agency prior to the disbursement of funds.[38] The HC/RC plays a crucial leadership role in the prioritisation of programmes, but the contractual grant agreement is between United Nations Office for the Coordination of Humanitarian Affairs and the recipient agency.[39]

Reporting and accountability provisions are included in the letter of understanding, which also includes a provision on the repayment of the unused portion of the grant. Grantees have to report to UN Office for the Coordination of Humanitarian Affairs on the use of the funds, as defined in the letter of understanding and monitoring by the Fund Manager and the Resident Coordinator or Humanitarian Coordinator.[40]

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[37] Interview with UN CERF

[38] CERF (2006, July 31). Project & Budget Template, p.2

[39] United Nations Office for the Coordination of Humanitarian Affairs (2006, July 31). Guidelines Central Emergency Response Fund (CERF): Grant Component, p5

4.2.1.3. Governance

The UN General Assembly governs the Fund at the macro level. The General Assembly receives an annual report from the Secretary-General on the management and use of the Fund and debates the CERF during its annual deliberations on the strengthening the coordination of humanitarian affairs.

In addition, an independent advisory group has been established to provide the CERF with policy guidance and expert advice. The advisory group consists of eight donor members and four independent experts. For the donor side attention is being paid to scale and magnitude of contributions, as well as geographical balance. The independent experts represent stakeholders such as governments, NGO's, academic and research institutes.[41] The UN Secretary General appointed the twelve members and four alternates of the advisory group on 28 April 2006.[42]

The advisory group meets twice a year. Tasks of the advisory group are to:

- Review the timeliness and appropriateness of Fund allocations;
- Review the management of the Fund, including reporting and the results achieved against Fund use;
- Review Fund performance against the objectives set by the General Assembly;
- Assess Fund levels and recommend Fund replenishment;
- Examine the two- year independent review, at the initiation of the Emergency Relief Coordinator, of the function and performance of the Fund;
- Consider the effectiveness of, and provide recommendations on, the CERF website.[43]

The advisory group makes recommendations to the Emergency Relief Coordinator for the improvement of Fund's implementation and use.

The daily management of the Fund is in the hands of the Emergency Relief Coordinator, who has a small, dedicated CERF Secretariat. In addition to the CERF Secretariat, the Emergency Relief Coordinator receives advice from the broader Office of Coordination of Humanitarian Affairs, located in New York, Geneva, and field locations. The CERF Secretariat team initially started with five members, and grew to the current size of eight employees. Future expansion of the Secretariat is foreseen. The overhead costs for CERF disbursements are a flat rate of 10%, where the CERF Secretariat charges 3%, and the recipient agency is allowed to charge 7%. These percentages are used for overhead costs and headquarters management.[44]

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[40] United Nations Office for the Coordination of Humanitarian Affairs (2006, July 31). Guidelines Central Emergency Response Fund (CERF): Grant Component, p7, 9

[41] CERF(2006). Advisory Group Terms of Reference, Article IV(11)

[42] CERF (2006). CERF Advisory Group. Retrieved at December 18, 2006, from http://ochaonline2.un.org/Default.aspx?tabid=7942

[43] CERF (2006). Advisory Group Terms of Reference, Article II (4)

Stakeholders are heard through both the General Assembly and the advisory group. In the advisory group developing countries also have a seat. At the field level no particular mechanism has been developed yet for a standardised procedure of stakeholder involvement. Nevertheless, the UN requirements ensure stakeholders involvement, for example through the consolidated appeal.

4.2.1.4. Strengths and weaknesses (as perceived by the fund)

Strengths

The possibility of CERF to respond to emergencies in multi-facetted ways gives CERF an added value to existing humanitarian funding mechanisms, which respond to one specific facet of a disaster by providing either food, or clothes, or medicines etc. Whereas standby funds for specific goals are still needed, the CERF can play a complementary role.

The complementary role of CERF also comes to the front if emergencies break out and existing mechanisms lack the capacity to carry the costs. An example of this is the Côte d'Ivoire yellow fever outbreak in 2006. In October, the Côte d'Ivoire Ministry of Health reported two cases of yellow fever. At that time, the WHO did not have funding available to start vaccination. The CERF funded vaccinations and two additional interventions to stop further spread of the disease.[45]

Another strong aspect of CERF is its decentralised approach. The priorities assessment of the emergency is concentrated at the field level, through the close cooperation with the Resident Coordinator or Humanitarian Coordinator and the Country Team, which is comprised of UN humanitarian organizations, NGOs, and the Red Cross Movement.[46]

Weaknesses

One of the reasons that lead to the establishment of CERF was to fill the time lag between the launch of an appeal to the time funds are actually received. With the establishment of the Fund, UN agencies and their implementing partners were given the possibility to access the Fund within 72 hours of the start of the crises.[47] During the first six months of implementation, CERF did not always manage to have final approval of the Emergency Relief Coordinator within 72 hours, thereby delaying the time to disbursement.[48] Steps have been taken to improve timely implementation, which is already evident.

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[44] Interview with UN CERF. The amount of overhead that NGOs who may receive onward disbursements from UN Agencies is not dictated by CERF procedures. These overheads should be charged according to existing agreements between UN Agencies and their implementing partners.

[45] Interview with UN CERF

[46] Not all UN Country Teams have representation from NGOs and the Red Cross. However, the ERC has requested that all Humanitarian Coordinators maintain Country Teams with NGO and Red Cross representatives.

[47] OCHA (2006). The Central Emergency Response Fund. Retrieved December 21, 2006, from http://ochaonline.un.org/webpage.asp?Site=cerf

[48] ECOSOC (2006, September 14). Report, p10, 11

One of the lessons learned concerned the high workload of the Secretariat during the set-up phase of the Fund. Policies of the Fund had to be developed, while at the same time the Fund had to be put into practical use, which proved to be a tremendous amount of work. Workload and staff resources need to commensurate.[49]

The mandate of the CERF grant element does not cover emergency preparedness and risk reduction. Experience from CERF has learned that grants and loans may be used in mutually reinforcing ways. This might lead to a future scenario in which the loan element is used more for preparedness and prevention activities, whereas the grant element is complementary in its rapid response form.[50]

Table 7: Main characteristics of the UN Central Emergency Response Fund

Introduction	
Name of fund	Central Emergency Response Fund
Type of fund/hosting organisation	UN
Emergency covered	CERF covers life saving intervention activities, not prevention and preparedness activities.
Targeted countries/regions	No specific target countries are set.
Capital of fund/total programme budget	The total capital of pledged and contributed for 2006 lies at US$ 300 million. Of this US$ 1.1 million has been pledged and US$ 299 million has been paid into the Fund. For 2007, US$ 343 million has been pledged, of which $40 m had been paid into the Fund as of 29 January 2007
Contributions to fund in 2005	Not applicable
Mobilisation of funding	
Contribution of donors	Governments, private organisations and individuals can contribute.
Contribution of eligible countries	In total 68 member states and three private donors have pledged. Individuals can donate through the United Nations Foundation online grant facility.
Contribution of private sector	The vast majority of contributions comes from governments, with less than 1% of the contributions coming from the private sector.
Management of fund's risk	US$ 30 million is kept as a reserve to respond to a sudden-onset emergency.
Intervention rules	
Eligibility criteria for recipients	The United Nations, its funds, programmes and specialized agencies, as well as the International Organization for Migration.
Co-financing requirements of recipients	Not applicable
Required institutional arrangement at the national level	In countries with a UN Resident or Humanitarian Coordinator, the application will be lodged by him or her following consultations with the "Country Team" (preferably to include UN, NGO, and Red Cross representatives). The grant agreement is signed between the United Nations and the humanitarian organization.

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[49] ECOSOC (2006, September 14). Report, p11

[50] General Assembly Economic and Social Council (2006, September 14). The Central Emergency Response Fund – Report of the Secretary General Addendum, Advanced Unedited Draft, p11

Funding limits for recipients or recipient countries	Rapid response grants for disasters or emergencies have a maximum funding limit of US$ 30 million. Funds must be committed within three months. For underfunded emergency grants there is no limit.
Rapid response mechanism	CERF consists of two elements, a loan and a grant element. The grant facility of the CERF has two components, one component for rapid response and one for underfunded emergencies.
Types of costs / losses covered	Proposals need to address core emergency humanitarian needs, i.e. life saving needs.
Incentives for risk-reduction	Not applicable
Procedural steps to trigger payments	The Emergency Relief Coordinator will send to the HC/RC and to the relevant Agency an approval letter and a draft letter of understanding (LoU) to be signed by an authorized representative of the recipient agency prior to the disbursement of funds. The LoU will be processed through the recipient agency's headquarters.
Monitoring of payments and expenditures	Reporting and accountability provisions are included in the LoU, that contains also a provision on the repayment of the unused portion of the grant. Grantees have to report to OCHA on the use of the funds, as defined in the LoU and monitoring by the Fund Manager and the HC/RC.
Governance	
Supervisory body	1. The United Nations General Assembly 2. The CERF Advisory Group
Number of employees managing fund	The Secretariat team started with five, and grew to eight members. Possible expansion of team in the future.
Administrative costs	The overhead is at a flat rate of 10%, of which 3% goes to the UN Secretary and 7% to the recipient agency. Overhead for forward disbursements from UN Agencies or IOM to NGOs/others as per usual operational agreements.
Fund management innovations	• Decentralised approach, i.e. the assessment of priority needs is carried out at field level, under the leadership of the UN humanitarian or resident coordinator. • The loan element is used as a cash-flow mechanism, so that projects can start immediately. In 2006 US$ 30 million has been provided in loans.
Role of beneficiary countries	Not applicable
Role of donors / multilateral agencies	Not applicable
Roles of other stakeholders	Stakeholders are heard through the General Assembly and the Advisory Group.

Source: Civic Consulting/CERF

4.2.2. The Global Fund to Fight AIDS, Tuberculosis and Malaria

The Global Fund to Fight AIDS, Tuberculosis and Malaria (the Global Fund) is a multi donor fund, created as a private Swiss foundation.[51] The initiative to create the Global Fund was launched in early 2001 by the then UN Secretary-General Kofi Annan. Solidarity grew as the G8 and the African Union started to pledge to the future fund.[52] The Global Fund to Fight AIDS, Tuberculosis and Malaria was registered under Swiss law in early 2002, and then its international Board met for the first time.[53]

The Global Fund does not target specific countries or regions, but has a flexible system under which it aims for a balanced distribution in relation to disease status, income levels and geography. An example of this is sub-Saharan Africa, which receives approximately 60% of Global Fund resources. At the same time, approximately 60% of the grant portfolio is allocated to HIV/AIDS grants. In total, 136 countries have been awarded funding to date.[54]

US$ 10.96 billion has been pledged in total to the Global Fund, of which US$ 8.12 billion has been paid as of 31 August 2007. Pledges to the Global Fund due in 2006 were US$ 2.03 billion.[55]

4.2.2.1. Mobilisation of funding

The large majority of the contributions to the Global Fund come from countries and/or multilateral agencies, with 7%[56] of the total being received from the private sector. At the Board level, donors have equal governance power with recipients in determining Global Fund policy.

The Global Fund does not set requirements for countries to donate specific amounts, however, countries might subject themselves to certain criteria. An example of this is the U.S. Government, which has to fulfil the legal requirement that the total of U.S. contributions will not exceed more than one-third of the total contributions received.[57]

Recipient countries are not obliged to contribute, but may do so. An example of this would be Nigeria, that has pledged so far US$ 30 million, or Russia, that in the upcoming years will donate to the Global Fund an amount equal to the total of grants received.[58]

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[51] Interview Ms Beatrice Bernescut, Information Officer, Production at the Global Fund, 15.11.2006 (From now on: Interview GFATM)

[52] Interview GFATM

[53] Global Fund to Fight AIDS, Tuberculosis and Malaria (2006). History of the Global Fund in Detail. Retrieved January 8, 2007, from: http://www.theglobalfund.org/en/about/road/history/default.asp

[54] Interview GFATM

[55] Global Fund to Fight AIDS, Tuberculosis and Malaria (2006). Pledges & Contributions to date. Retrieved at September 12, 2007 from: http://www.theglobalfund.org/en/funds_raised/pledges/

[56] Based on calculation Global Fund (2006). Pledges & Contributions to date. Retrieved at November 17, 2006 from: http://www.theglobalfund.org/en/funds_raised/pledges/

[57] Interview GFATM

[58] Interview GFATM

The private sector so far pledged US$ 655 million, of which US$ 267 million had been paid as of December 2006. The two largest donors in the private sector are the Bill and Melissa Gates Foundation, and *Product-Red*.[59] The Global Fund is an advocate for a reliable flow of resources in order to ensure that the prevention and treatment programs it finances are sustainable in the long term and that they are achieving their health results. The traditional funding sources (i.e. the donations from donor governments), though the foreseen major source of financing, will not be sufficient to meet the vast financial requirements in the future. Therefore, the Global Fund is engaged in an international debate about new innovative financial instruments. The most important mechanisms under debate are:

- The International Finance Facility (IFF);[60]
- Debt conversion;[61]
- The solidarity contribution on air travel (UNITAID).[62]

An innovative aspect of the Global Fund concerns the management of the Global Fund's risk. The traditional grant-funding model is based on a pie that is being divided between the recipients. The Global Fund works the other way around: Proposals are reviewed for technical and scientific validity, and ranked according to set criteria. Those proposals for which funding is available are approved by the Board. To date, there have been six rounds of grants, and in each of these rounds all recommended proposals were approved for funding; however, there have been rounds where this was only achieved by last-minute fundraising and in one round proposals had to be approved in stages as money became available.[63]

4.2.2.2. Intervention rules

There are three categories of minimum requirements for funding: applicant type, income level and, for upper-middle income countries, also disease burden.[64] These categories depend on the World Bank Income Classification where the following categories are eligible recipients;

- Low-Income Countries;
- Lower-Middle Income Countries;
- Upper-Middle Income Countries.

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[59] (Product)^{RED} and Partners: American Express, Converse, GAP, Giorgio Armani, Motorola Inc., Apple

[60] "The idea behind "frontloading" is to use future expenditures on ODA and pledge them to the IFF as security for the issue of AAA-rated bonds, which would be offered in the international capital markets and so generate additional cash for development financing." (Global Fund to Fight AIDS, Tuberculosis and Malaria (2005). Financing the Fight Against AIDS, Tuberculosis and Malaria: Prospects of the International Finance Facility, p.4.)

[61] Debt conversion is the exchange of debt - typically at a substantial discount - for equity, or counterpart domestic currency funds to be used to finance a particular project or policy. Debt for equity, debt for nature and debt for development swaps are all examples of debt conversion. (OECD (2001). OECD Glossary of Statistical Term. Retrieved at January 11, 2007, from: http://stats.oecd.org/glossary/detail.asp?ID=552)

[62] Global Fund to Fight AIDS, Tuberculosis and Malaria (2007). Partnerships for Innovative Financing. Retrieved at January 11, 2007 from: http://www.theglobalfund.org/en/funds_raised/innovative_financing/

[63] Interview. The exact ranking criteria can be found in: Ibid, (2004). Decision Points Board Meeting Round 7, p11 - 12

[64] Ibid, (2006). Sixth Call for Proposals Frequently Asked Questions, p2.

High-Income Countries are not eligible for receipt. Lower-Middle Income Countries and Upper-Middle Income Countries need to fulfil additional criteria on counterpart financing[65], which are as follows;

- Lower-middle income countries must demonstrate counterpart financing with a progressive increase from 10% in year 1 to 20% over the duration of the proposal.
- Upper-middle income countries must demonstrate counterpart financing with a progressive increase from 20% in year 1 to 40% over the duration of the proposal.[66]

Both these country groups also have to demonstrate their focus on poor or vulnerable populations, by which they need to describe specifically:

- Which poor and vulnerable populations are targeted by the proposal;
- Why and how these population groups have been identified; and
- How they will be involved in planning and implementing the proposal.[67]

Applicants from Upper-Middle Income Countries are eligible to apply for support from the Global Fund provided that they face a high current national disease burden. The criteria for these are listed in the following table.

Table 8: Criteria for country disease burden

Disease	Country Disease Burden
HIV/AIDS	Ratio of adult HIV seroprevalence (as reported by UNAIDS, multiplied by 1000) to Gross National Income per capita (Atlas method, as reported by the World Bank) exceeds 5.
Tuberculosis	Country is on the WHO list of 22 high burden countries, or on the WHO list of the 41 countries that account for 97% of estimated burden of new tuberculosis cases attributable to HIV/AIDS.
Malaria	More than 1 death per 1000 people per year due to malaria.

Source: GFATM, Guidelines for Proposals, Sixth Call for Proposals, p4

To approach projects through a country-driven, coordinated and multi-sector approach involving all relevant partners,[68] the Global Fund expects proposals development and submission to be coordinated through a Country Coordinating Mechanism.[69] In its grant proposal, a Country Coordinating Mechanism should nominate one or a few Principal Recipients to be responsible for implementation and accountable for the financial and programmatic reporting of the grant.[70]

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[65] "Counterpart financing" is defined as all domestic resources dedicated to the disease control program. This includes: contributions from governments; loans from external sources or private creditors; proceeds from debt relief; and private contributions, including those from non-governmental organizations, faith-based organizations, other domestic partners, and user fees." Ibid (2006). Guidelines for Proposals, Sixth Call for Proposals, p4.

[66] Ibid (2006). Guidelines for Proposals, Sixth Call for Proposals, p4.

[67] Ibid, (2006). Guidelines for Proposals, Sixth Call for Proposals, p4

[68] Ibid (2005). Revised Guidelines for Purpose, Structure and Composition of Country Coordinating Mechanisms and Requirements for Grant Eligibility, p1

[69] Ibid (2006). Guidelines for Proposals, Sixth Call for Proposals

The concept of a Country Coordinating Mechanism started as a recommendation, and has developed itself into a requirement for the recipient country.[71] The Country Coordinating Mechanism can be either a National Country Coordinating Mechanism (CCM), a Sub-National Coordinating Mechanism (Sub-CCM) or a Regional Coordinating Mechanism (RCM).[72]

CCMs should build on and be linked to existing mechanisms for planning at the national level and be consistent with national strategic plans. The CCM is the representative of all interested stakeholders at the national level for grants received from the Global Fund, CCMs are instrumental in developing proposals and overseeing the utilization of Global Fund resources.[73] The CCM is not a legal entity in the recipient country, and the rules of the CCM are defined by the recipient country.[74]

It is the responsibility of the country to work closely with the CCM on the setting of targets. The Global Fund recommends countries to set fewer rather than more targets, and to use the grant filing and evaluation tool kit as a guideline to set their targets.

Before the Global Fund decides to enter a grant agreement with an entity that has been nominated by a Country Coordinating Mechanism, a Local Fund Agent will assess the required minimum capacities of the nominated Principal Recipient.[75] The Global Fund does not have local agencies in the countries itself, but contracts the Local Fund Agent to provide independent and professional advice on grant progress, requests for funding and local circumstances. In addition to the above-described assessment of the minimum capacities before grant agreement, the Local Fund Agent's main tasks are:

- To review the progress updates and requests that are submitted regularly by the Principal Recipient during program implementation. The Local Fund Agent verifies that targets have been reached and expenses incurred as reported and makes a recommendation to the Global Fund on how much to disburse to the Principal Recipient;
- To provide information to the Global Fund on the results of the grant;
- To assist the Global Fund with closure of the grant;
- To perform ad hoc services, such as investigations into the suspected misuse of funds.[76]

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[70] Ibid (2003). Guidelines for the principal recipient assessment, p5

[71] Interview GFATM

[72] Global Fund to Fight AIDS, Tuberculosis and Malaria (2006). Guidelines for Proposals, Sixth Call for Proposals, p.6

[73] Ibid, (2005). Revised Guidelines on the Purpose, Structure and Composition of Country Coordinating Mechanisms and Requirements for Grant Eligibility, p2

[74] Interview GFATM

[75] Global Fund to Fight AIDS, Tuberculosis and Malaria (2003). Guidelines for the Principal Recipient Assessment, p.2

[76] Ibid, (2007). Local Fund Agents Frequently Asked Questions. Retrieved at January 18, 2007 from: http://www.theglobalfund.org/en/about/structures/lfa/faq/

There are currently six active Local Fund Agents working in approximately 130 countries. They are PricewaterhouseCoopers, KPMG, Emerging Markets Group, Swiss Tropical Institute, UNOPS and Crown Agents.

There is no specific rapid-response function of the Global Fund, however, the time frame between grant application and approval is short. Recipients have to issue a proposal, and after that it takes approximately three months from the submission deadline to Board approval for a financing period of the first two years of the proposal.

Once a proposal is submitted, it will go through a first screening by the Secretariat. After this screening all eligible proposals are then reviewed by the independent Technical Review Panel, who will then recommend a number of proposals to the Board. The Board decides whether or not a project will be funded for the upcoming two years.[77] During this two-year period resources are used to implement activities "for the prevention, treatment, care and support of people and communities living with and/or affected by the three diseases."[78]

After Board approval the Global Fund Secretariat requests the Local Fund Agent for the country to assess the financial management and administrative capacity of the nominated Principal Recipient(s). Based on the Local Fund Agent's assessment, the Principal Recipient may require technical assistance to strengthen capacities. Development partners may provide or participate in such capacity building activities. The strengthening of identified capacity gaps may be included as conditions precedent to disbursement of funds in the grant agreement between the Global Fund and the Principal Recipient.

The Global Fund functions on so-called performance-based funding. The majority of the proposals submitted to the Global Fund are for a period of five years. When the Board agrees for funding, it only does so for the first two years of proposal. Once the project starts the Local Fund Agent starts a process of continuous monitoring.

The monitoring reports prepared by the Local Fund Agent are reviewed by the Fund Portfolio Manager at the Secretariat. Upon evaluation at the end of the first two-year period the financing for the remaining years of the grant can be dependent upon fulfilment of conditions or be refused. This might happen when, for example, financial resources from previous rounds have not been used. For this the UN rules on well performing and poorly performing are followed. It is also possible that if a project is performing poorly more supervision (e.g. quarterly) is installed, in comparison to a project that is performing well, and will be reviewed every half year.[79]

4.2.2.3. Governance

The Global Fund has a board of twenty-four members, twenty voting and four non-voting members. The exact composition is as follows:

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[77] Global Fund to Fight AIDS, Tuberculosis and Malaria (2006). The Global Fund's Proposals Process in Brief. Retrieved at November 17, 2006, from: http://www.theglobalfund.org/en/apply/proposals/

[78] Ibid, (2006). Guidelines for Proposals, Sixth Call for Proposals, p.22

[79] Interview GFATM

- Seven representatives from developing countries, one representative based on each of the six World Health Organization (WHO) regions and one additional representative from Africa;
- Eight representatives from donors;
- Five representatives from civil society and the private sector (one representative of a non-governmental organization (NGO) from a developing country, one representative of an NGO from a developed country, one representative of the private sector, one representative of a private foundation, and one representative of an NGO who is a person living with HIV/AIDS or from a community living with tuberculosis or malaria).

The four ex-officio nonvoting members of the Foundation Board consist of:

- One representative from the WHO;
- One representative from the Joint United Nations Programme on HIV/AIDS;
- One representative from the trustee; and
- One Swiss citizen with his or her domicile in Switzerland authorized to act on behalf of the Foundation to the extent required by Swiss law.[80]

The seats in the donor section are given to those donors that contribute the largest amounts. The Board is responsible for the overall governance of the organisation, including the approval of grants.[81]

Approximately 300 full-time employees are working at the Secretariat in Geneva. The Secretariat is responsible for the day-to-day operations, including mobilizing resources from the public and private sectors, managing grants, providing financial, legal and administrative support, and reporting information on the Global Fund's activities to the Board and the public.[82] The management expenses are slightly less than three per cent of the total grants, including the fees for the Local Fund Agents.[83]

To give other stakeholders the possibility to provide feedback on the development of the Global Fund, a bi-annual Partnership Forum is organised. In practise this is a conference for stakeholders.

4.2.2.4. Strengths and weaknesses (as perceived by the fund)

Strengths

One innovative aspect of the Global Fund is the high level of transparency, including on financial issues. This also contributes to building donor trust. An example of this is that all documentation available on the Global Fund is available on the website. Further strengths as perceived by the Global Fund are:

- High coverage, in terms of geography and population;

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[80] Global Fund to Fight AIDS, Tuberculosis and Malaria (2006). By-laws, as amended April 27, 2006, p.3, 4

[81] Interview GFATM

[82] Global Fund to Fight AIDS, Tuberculosis and Malaria (2006). About the Global Fund – Secretariat. Retrieved at December 7, 2006, from: http://www.theglobalfund.org/en/about/secretariat/

[83] Interview GFATM

- Expenditure and efficiency are under continuous control;
- Country ownership;
- Flexibility.

Weaknesses and improvements

Due to its recent establishment, there are areas where the Global Fund is still learning what are the best practices. However, as mentioned above, this also contributes to the Global Fund's flexibility. Areas that still need further development are:

- Higher involvement rates of civil society;
- Improve the success rate of proposals submitted;
- Further improvement of the Local Fund Agent system.[84]

Table 9: Main characteristics of Global Fund to Fight AIDS, Tuberculosis and Malaria

Introduction	
Name of fund	Global Fund to Fight AIDS, Tuberculosis and Malaria (the Global Fund)
Type of fund/hosting organisation	Multi donor fund, registered as a private Swiss foundation.
Emergency covered	HIV/AIDS, tuberculosis and malaria
Targeted countries/regions	Low- and lower-middle countries or those countries where the diseases are reaching epidemic level.
Capital of fund/total programme budget	US$ 10.96 billion has been pledged in total to the Global Fund, of which US$ 8.12 billion has been paid as of 31 August 2007.
Contributions to fund in 2005	US$ 1.5 billion
Mobilisation of funding	
Contribution of donors	Most contributions come from donor countries.
Contribution of eligible countries	Eligible countries are not obliged to contribute, but may do so.
Contribution of private sector	The private donor so far pledged to date US$ 655 million, of which US$ 267 million had been paid until December 2006.
Management of fund's risk	Proposals are first reviewed for technical and scientific validity. Proposals are ranked according to set criteria, and those proposals for which funding is available are approved.
Intervention rules	
Eligibility criteria for recipients	The following categories of countries are eligible for funding: • Low-Income Countries • Lower-Middle Income Countries • Upper-Middle Income countries with a high disease burden

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[84] Interview GFATM

Co-financing requirements of recipients	Lower-Middle Income Countries and Upper-Middle Income Countries need to fulfil counterpart-financing criteria.
Required institutional arrangement at the national level	The Global Fund expects proposals to be coordinated through a Country Coordination Mechanism.
Funding limits for recipients or recipient countries	None
Rapid response mechanism	The time frame between grant application and approval is short, but is not a rapid response.
Types of costs / losses covered	Resources from the Global Fund may be used to support activities for the prevention, treatment, care and support of people and communities living with and/or affected by the three diseases.
Incentives for risk-reduction	Not applicable
Procedural steps to trigger payments	After the Board has given approval the Local Fund Agent certifies the financial management and administrative capacity of the nominated Principal Recipients. The Secretariat and Principal Recipient negotiate a grant agreement, and sign it. Based on request from Secretariat, the World Bank makes initial disbursement to the Principal Recipient. The Principal Recipient makes the disbursements to sub-recipients for implementation, as called for in the proposal.
Monitoring of payments and expenditures	After board approval five-year proposals receive initially two year financing. Continuous monitoring will then be carried out by the Local Fund Agent, according to the UN rules on well performing and poorly performing. Approval of funding for the remaining years of the grant is dependent upon results obtained, based on the performance criteria established by the country in conjunction with the Global Fund.
Governance	
Supervisory body	The Global Fund has an interactive board of 24 members, of which 20 are voters and 4 are non-voters. 10 voters represent the donor side (countries, private sector etc.), and 10 voters represent the recipient side (NGOs, countries).
Number of employees managing fund	There are about 300 full-time employees at the Global Fund Secretariat in Geneva.
Administrative costs	The management expenses are slightly less than three per cent of the total grants, including the fees for the Local Fund Agents
Fund management innovations	High level of transparency, e.g. all documentation is available online.
Role of beneficiary countries	The Country Coordinating Mechanism of the country is responsible for determining the national plan and priorities for each disease, for submitting the proposal to the Global Fund, and for overseeing implementation of the grant. The Local Fund Agent, together with the Country Coordinating Mechanism, carries out the checks.
Roles of other stakeholders	Stakeholders can participate both at the country level, either by serving on the Country Coordinating Mechanism or by being an implementing agency for part or all of the funded programs. They can also participate on the international level by working within their respective delegations to the Board. Stakeholders can also give their feedback on the development of Global Fund at a bi-annual partnership forum.

Source: Civic Consulting/GFATM

4.2.3. WFP Working Capital Financing Facility

The WFP Secretariat implemented in 2003 a Business Process Review (BPR) of WFP business processes and procedures designed to improve organizational efficiency, maximize the use of resources and better respond to the needs of beneficiaries by improving the on-time availability of food aid.[85] One of the BPR's recommendations was to establish the Working Capital Financing Facility (WCF).

"The concept presented to the E[xecutive] B[oard] was to utilize the temporary cash surplus resulting from the receipt of contributions from donors in advance of expenditures actually being incurred. This cash held in WFP's treasury would be loaned to the eligible pilot projects based upon demonstrated need and their ability to repay the funds upon the receipt of confirmed contributions from donors."[86]

In February 2004, the Board approved the use of the Operational Reserve to finance five pilot projects on the basis of forecast contributions. The first five pilot projects started in 2004 in the Democratic Republic of Congo, Indonesia, the Palestinian Territories, West African Coastal and Cambodia. The Cambodia project was cancelled due to operational concerns, after which the China country programme was added. In 2005 this group was extended with five pilot projects in Ethiopia, Uganda, Southern African Regional, Sudan and Sudan (Darfur).[87]

The purpose of the loans of the WCF has generally been to procure food to begin projects on a timely basis, prior to the confirmation of donor contributions or to avoid pipeline breaks resulting from delays in the receipt of contributions.[88] A total of US$185.1 million in loans had been authorized under the WCF facility from its inception in 2004 through 31 March 2006. Of this amount, US$167.6 million has been repaid leaving a balance of US$17.5 million (9.5 percent).[89]

4.2.3.1. Mobilisation of funding

The WFP relies on voluntary contributions from governments, corporations and individuals. The large majority of the contributions come from governments, whose donations comprise both cash and food.[90]

Some donor governments might put certain limitations to their contribution to WFP, thereby limiting the opportunities for flexible use of donations. Examples of such limitations are the earmarking of donations for certain projects, or a limitation on using the donors' contribution to finance expenditures in advance of the receipt of the contribution.[91]

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[85] WFP (2006). A Report from the Office of Evaluation Full Report of the Evaluation of the Business Process Review (BPR), p1

[86] WFP (2006). A Report from the Office of Evaluation Full Report of the Evaluation of the Business Process Review (BPR), p22

[87] WFP (2006). A Report from the Office of Evaluation Full Report of the Evaluation of the Business Process Review (BPR), p4

[88] WFP (2006). A Report from the Office of Evaluation Full Report of the Evaluation of the Business Process Review (BPR), p22.

[89] WFP (2006). A Report from the Office of Evaluation Full Report of the Evaluation of the Business Process Review (BPR), p23

[90] WFP (2007). How WFP is funded. Retrieved at February 09, 2007 from: http://www.wfp.org/aboutwfp/funding/index.asp?

[91] WFP (2006). A Report from the Office of Evaluation Full Report of the Evaluation of the Business Process Review (BPR), p29

WCF uses the temporary cash surplus of the WFP to finance loans. The Operational Reserve is committed should the loans become impossible to repay.[92] "Use of the Operational Reserve may total about US$6.2 million, i.e., less than 3.3 percent of the total amount loaned and less than 1 percent of the total budgets of the nine pilot projects, which is well within the risk guideline originally proposed."[93]

To enable the Executive Director to ensure continued financing of projects pending confirmation of forecast contribution, the WCF has an advance ceiling of US$ 180 million (Financial Regulation 10.8). "In addition, changes were approved in the Financial Regulations to allow expenditures to be incurred during project preparation (FR 8.1) and use of the Operational Reserve to cover cases where a forecast contribution used as collateral for a WCF does not materialize (FR 10.6)."[94]

To back-up the lending facility, WFP has a 'risk reserve' of US$ 20 million per year to write-off any unrecoverable loans. Since mid-2004, WFP has lent US$ 210 million with over 95% repaid as of November 2006.[95]

4.2.3.2. Intervention rules

Once applications are received they are reviewed by the Office of Budget, which is administratively responsible for the WCF, and by the Operations Department. Any additional information deemed necessary is obtained from the applicant. Once this process has been completed, a meeting of the Credit Committee is scheduled.[96] The meetings are generally scheduled within five days of the receipt of an application. The applicant is given the opportunity to make a presentation and ask questions. The Committee then makes a decision.[97]

The only requirement on WCF loans is that recipient country offices need to be making maximum use of the resources they have available and agree to their eligible future income becoming collateral. Projects can only apply for an advance up to the limit of their discounted eligible forecast income. Donor constraints limit repayment possibilities making some forecast contributions ineligible as collateral. Lending can also be constrained by the overall ceiling on total WCF loans outstanding. A breakdown of loan components can be found in the following table:

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[92] WFP (2006). A Report from the Office of Evaluation Full Report of the Evaluation of the Business Process Review (BPR)

[93] WFP (2006). Summary Report of the Evaluation of the Business Process Review, p3 (Executive Board Annual Session, Rome 12-16 June 2006, Agenda Item 7)

[94] WFP (2006). A Report from the Office of Evaluation Full Report of the Evaluation of the Business Process Review (BPR), p4

[95] Email WFP by Bronwyn Cousins, 27 November 2006

[96] The Credit Committee consists of the Senior Deputy Executive Director, Director [the Office of the Executive Director – Special Projects], Chief Financial Officer, Director Change Management, Deputy Executive Director (Administration Department) and the Deputy Executive Director (Fund Raising and Communications Department).

[97] WFP (2006). A Report from the Office of Evaluation Full Report of the Evaluation of the Business Process Review (BPR), p22

Table 10: Breakdown of loan components

Type of cost	Expenditure (in US$)	Percentage of total
Commodity	92,670,950	50 %
External Transport	16,801,728	9 %
Landside Transport, Storage and Handling	51,139,640	28%
Other Direct Operational Costs	7,612,928	4 %
Direct Support Costs	16,888,082	9%
Total	**185,113,329**	**100 %**

Source: Data as of 31 March 2006. Calculation based on: WFP (2006). A Report from the Office of Evaluation Full Report of the Evaluation of the Business Process Review (BPR), p24

There is no guideline or manual in which the criteria for approval of Work Capital Financing loans are consolidated. However, in 2005 by the Regional Directors and Regional Financial Analysts provided the following criteria:

- All Business Process Review building blocks must be in place. Preparation of accurate project planning tools and timely submission of quarterly review information;
- A loan must address the timing mismatch between forecast contributions and current needs;
- Working Capital Financing loans are “senior” to all other outstanding loans;
- There should be a suitable (comprehensive) rationale, including the value added to beneficiaries;
- There must be sufficient collateral to secure the loan. High probability forecast contributions are discounted at 75 percent and medium probability at 50 percent. Low probability contributions are not eligible as collateral;
- Details of the repayment schedule must be provided;
- The Working Capital Financing application must be signed by the Country Director (if applicable) and Regional Director.[98]

As a mean of risk reduction, the staff in the Fund Raising and Communications Department prepared for each pilot project a detailed forecast of individual contributions anticipated for the project by donor and anticipated date of receipt. These contributions are classified as high, medium or low probability. All classifications and forecasts are based on the donor’s previous contributions to similar projects or to the country involved. The Fund Raising and Communications Department – Donor Relations determines the probability of a confirmation based on communication with the donor and the general history of the donor’s contributions to WFP.[99]

“The forecasting of donations has assisted managers to better estimate the resources available to the pilot projects and to repay advances made from the WCF loans and PCA advances. The accuracy of the forecasts varies considerably, however, highlighting the need for improved communication between forecasting staff and operational staff in order to minimize the risk of lending decisions being based on incomplete understanding of the determinants of the forecasts, in particular donor conditionality."[100]

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[98] WFP (2006). A Report from the Office of Evaluation Full Report of the Evaluation of the Business Process Review (BPR), p25

[99] WFP (2006). A Report from the Office of Evaluation Full Report of the Evaluation of the Business Process Review (BPR), p27

Loans of the WCF are only accessible when the Country Office or Regional Bureau of the WFP agrees to produce a monthly financial and operational plan that shows income, expenditure and distribution during the life of the project. In addition, the Regional Director and Country Director of the project must agree to participate in a quarterly review which brings together each WFP department to discuss the project's financial and operational plan to make sure that all issues, financial and otherwise, are brought to light. A team at headquarters is responsible for monitoring the risk, both on a project-specific and an organization-wide level, associated with outstanding obligations. This team is also responsible for convening monthly sessions to discuss each project's credit standing as well as any strategic issues relating to working capital financing.[101]

4.2.3.3. Governance

The WFP Executive Board has been established by United Nations General Assembly resolution 50/8; FAO Conference resolution 9/95 and compromises 36 Member States of the UN and the FAO. The Board oversees WFP's humanitarian and development food aid activities.

The Board meets three times a year at WFP's Headquarters in Rome. The Executive Director, appointed jointly by the United Nations Secretary-General and the Director-General of the UN Food and Agriculture Organisation for five-year terms, sits at the head of the Secretariat of WFP. The Office of the Executive Director – Special Projects is administratively responsible for the WCF.

As outlined in Article V of the General Regulations, the Board comprises 36 States Members of the United Nations and/or UN Food and Agriculture Organisation. Of these, 18 are elected by the Economic and Social Council of the United Nations (ECOSOC) and 18 by the Council of UN Food and Agriculture Organisation. Each State Member serves three-year terms and is eligible for re-election.

The Credit Committee is an advisory group to the Executive Director that provides recommendations on individual loans. During 2006 there were 2 full time and 3 part time employees with support from many other HQ units as well as the country office and regional bureaus responsible for the administration of WCF. No specific WCF admin costs charged to recipient projects for loans but WFP charges a standard 7% support cost on all contributions received by the programme.

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[100] WFP (2006). A Report from the Office of Evaluation Full Report of the Evaluation of the Business Process Review (BPR), pvi

[101] Email WFP (Bronwyn Cousins), 27 November 2006

Strengths and weaknesses (as perceived by WCF)

Strengths

- The advance funds to operations based upon the anticipated receipt of contributions which are forecast by Fund Raising and Communications Department – Donor Relations. This is a significant departure from WFP's usual procedures, which allow expenditures to be incurred for operations only upon the receipt of written confirmation from donors.[102]

- The Advisory Committee recognizes "the very positive results achieved through working-capital financing in the pilot projects, and notes that this business model introduces a great deal of flexibility at the operational level, as well as an increased level of authority delegated to the Executive Director for authorizing advance spending. The Advisory Committee emphasizes the need for timely, close and careful monitoring to accompany these new measures." [103]

Weaknesses

- The guidelines available to assist in understanding the use of the loan facilities and repayment procedures have been limited and lacking in consistency. Pilot project managers expressed concern regarding the lack of information about relevant policies.[104] In the Business Process Review of 2006 recommendations were made to improve the guidelines of loan approval. Most operational WFP staff have a limited understanding of the whole Business Process Review process, however, and need comprehensive guidelines on borrowing options such as the Working Capital Financing (WCF), the Project Cash Account (PCA), the Immediate Response Account (IRA), the Direct Support Costs Advance Facility (DSCAF) and CERF and on priorities for reimbursement.[105]

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[102] WFP (2006). A Report from the Office of Evaluation Full Report of the Evaluation of the Business Process Review (BPR), p27

[103] WFP (2005). Executive Board Annual Session Rome, 6–10 June 2005. Report of the Advisory Committee on Administrative and Budgetary Questions, Agenda Item 6, p3

[104] WFP (2006). A Report from the Office of Evaluation Full Report of the Evaluation of the Business Process Review (BPR), p16

[105] WFP (2006). Summary Report of the Evaluation of the Business Process Review, p7 (Executive Board Annual Session, Rome 12-16 June 2006, Agenda Item 7)

Table 11: Main characteristics of WFP Working Capital Financing Facility

Introduction	
Name of fund	Working Capital Financing (WCF) Facility
Type of fund/hosting organisation	UN World Food Programme (WFP)
Emergency covered	Hunger
Targeted countries/regions	In 2004 WFP piloted working capital financing in five operations. Based on the results of these pilots, the Executive Board authorized the Secretariat to roll-out the WCF facility to a maximum of seven additional country operations. To date the WCF has given advances to WFP projects in the Democratic Republic of Congo, Indonesia, Southern Africa, Uganda, West Africa Coastal, Sudan, China, Niger and the Occupied Palestinian Territories. In 2007 WFP will roll-out WCF to all qualifying operations. WFP has operations in 82 countries around the world.
Capital of fund/total programme budget	In 2005 the WFP Executive Board approved a working capital ceiling of US$180 million
Contributions to fund in 2005	The facility does not seek directed contributions but leverages WFP's overall working capital or equity. Comprehensive guidelines due to be released and a refined financial planning tool and training are planned for 2007.
Mobilisation of funding	
Contribution of donors	Contributions to WFP come from governments, corporations and individuals. The large majority of the contributions come from governments.
Contribution of eligible countries	Recipient countries contribute a small proportion of funds overall. Contributions from recipient countries are more likely to come in the form of in kind contributions.
Contribution of private sector	WFP is increasingly appealing to the private sector for funding.
Management of fund's risk	The maximum annual write-off is estimated at US$20 million. This is covered by the Operational reserve. WFP has put a lot of effort into optimising project expenditure planning and income forecasting and these factors are very important when assessing each loan application. The Office of Budget and Financial Planning ensures that the organisations overall exposure is monitored and taken into account when advances are considered.
Intervention rules	
Eligibility criteria for recipients	A country office needs to satisfactorily participate in quarterly operational review(s) and there must be a joint agreement by the operations department, Office of Budget and the respective Regional Financial Analyst that the country office is ready in terms of having the necessary financial planning tools and training. Specifically, all systems and data must be in order, there must be strong pipeline management, Field Level Agreements with partners must be in place and internal controls must be in place for monitoring. There must also be strong understanding of long-term financing and full cost recovery as well as good connectivity to keep corporate systems up-to-date.
Co-financing requirements of recipients	Recipient country offices need to be making maximum use of the resources they have available and agree to their eligible future income becoming collateral.
Required institutional arrangement at the national level	See answer above on eligibility criteria. WCF loans are only given to WFP country offices or Regional Bureaus.
Funding limits for recipients or recipient countries	Projects can only apply for an advance up to the limit of their discounted eligible forecast income. Donor constraints limit repayment possibilities making some forecast contributions ineligible as collateral. There is a ceiling on total WCF loans outstanding at any given time of US$180 million.

Rapid response mechanism	The WCF enables the WFP to start projects through loans before contributions are announced. (WCF can be provided to a project prior to its official start date to pre-fill the pipeline, taking into account lead times, to ensure seamless distribution). Projects can request WCF throughout the life of a project. HQ aims to give a decision on the loan within 5 working days of receiving a full loan request package.
Types of costs / losses covered	Food aid activities.
Incentives for risk-reduction	Contributions are forecasted into high, medium or low probability to estimate the resources available to pilot projects and to repay advances made. Contribution forecasts are continuously being monitored so that project expenditure can be adjusted. Should a country office or regional bureau not manage their finances optimally or not participate satisfactorily in reviews, they may jeopardize their chances of receiving future loans.
Procedural steps to trigger payments	The project manager is required to confirm that: - The project has the logistical capacity to absorb any commodities purchased with the WCF; - The project will submit quarterly Financial Statements to the Credit Committee by the 20th of January, April, July and October; - Working capital financing is ‘senior’ to all other loans – i.e., the WCF has first creditor rights to be repaid in full prior to repayment of other borrowings; - All borrowings against forecasted income have been accurately reflected in the Financial Statements. Once applications are received they are reviewed by the Office of Budget, and by the Operations Department. Any additional information deemed necessary is obtained from the applicant. Once this process has been completed, a meeting of the Credit Committee is scheduled, generally within five working days of the receipt of an application. The Committee makes a decision, which is immediately reported to the applicant.
Monitoring of payments and expenditures	The Country Office/Regional Bureau must produce a monthly financial and operational plan that shows income, expenditure and distribution during the life of the project. The Regional Director and Country Director of the project must agree to participate in a quarterly review which brings together each WFP department to discuss the project’s financial and operational plan to make sure that all issues, financial and otherwise, are brought to light.
Governance	
Supervisory body	The WFP Executive Board compromises 36 Member States of the UN and the FAO. It oversees WFP’s humanitarian and development food aid activities. The Credit Committee is an advisory group to the Executive Director that provides recommendations on individual loans. The Credit Committee is made up of the CFO and the directors from Fundraising, Administration, Change Management, Programme Management, the Offices of the Executive Director and the Office of Budget and Financial Planning.
Number of employees managing fund	During 2006 there were 2 full time and 3 part time employees with support from many other HQ units as well as the country office and regional bureaus.
Administrative costs	No specific WCF admin costs charged to recipient projects for loans but WFP charges a standard 7% support cost on all contributions received by the programme.
Fund management innovations	Addresses the timing mismatch between when expenditure needs to be made and when contributions are forecasted to arrive.
Role of beneficiary countries	See section on intervention rules
Role of donors / multilateral agencies	Not applicable
Roles of other stakeholders	Not applicable

Source: Civic Consulting/WFP

4.2.4. OIE World Animal Health and Welfare Fund

In May 2004 the International Committee of the OIE adopted Resolution No. XVII on the Creation of a World Animal Health and Welfare Fund. The Resolution decided that a special account, entitled the World Animal Health and Welfare Fund, shall be created in the accounts of the OIE, with the Director General to be responsible for implementing the Resolution.[106]

In the Appendix of the Resolution, it was laid down that the purpose of the Fund is to support:

- Implementation of action programmes;
- Implementation of training programmes;
- Organisations of seminars, conferences and workshops;
- Editing and distribution of scientific and technical publications;
- Production of information media;
- Implementation of basic and applied scientific research programmes;
- OIE Strategic Plans approved by the Member Countries;
- Activities of developing countries in the aforementioned fields.[107]

The main focus of the fund is good governance in the veterinary sector as in line with the priority provisions in the Fourth OIE Strategic Plan (2006-2010). The current framework of the Fund is described in the OIE publication on “Ensuring Good Governance to Address Emerging and Re-emerging Disease Threats – Supporting the Veterinary Services of Developing Countries to Meet OIE International Standards on Quality”.[108] This concept paper lays down the activities and the work programme of the Fund: capacity building; evaluation of Veterinary Services; OFFLU Network. Complementary concepts have been added since the Pledging Conference of Beijing (January 2006), notably: an Avian Influenza Vaccine Bank and Reference Laboratory Twinning programmes. “The OIE should use the World Animal Health and Welfare Fund to support its Member Countries by analysing and promoting a general framework for financing support to a global governance system for animal health.”[109]

The total income of the Fund as of 31 December 2006, is EUR 24.2 million, of which EUR 10.6 million had been paid.[110] 2006 was also the first full year of the fund’s operation.

The 2006 capital has mainly been used for identification of priority investments, the training of OIE Performance, Vision and Strategy (PVS) experts, and the evaluation of Veterinary Services in fifteen pilot countries in all continents.[111] PVS is described in more detail in the section below on intervention rules. The fifteen countries in which the PVS pilot project was implemented are Brazil, Cameroon, Chad, Costa Rica, Cote d'Ivoire, Djibouti, Indonesia, Jamaica, Kenya, Kyrgyz Republic, Laos, Mexico, Ukraine, Vietnam and Yemen.[112] After the pilot project, PVS missions have continued and in total 36 missions have taken place (as of August 30, 2007).

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[106] OIE International Committee (2004). Resolution XVII, Article 1

[107] OIE (2004). Appendix to Resolution XVII, Article 2

[108] OIE (2006). Ensuring good governance to address emerging and re-emerging animal disease threats. Retrieved at March 01, 2007, from: http://www.oie.int/downld/Good_Governance/A_good_gouvernance.pdf

[109] OIE (2006). Resolution XXXV, Recommendation 4

[110] OIE (2007). The OIE World Animal Health and Welfare Fund

4.2.4.1. Mobilisation of funding

When the World Animal Health and Welfare Fund was set up, it was foreseen that the resources for the Fund would consist of subsidies, donations and legacies provided by public or private bodies or institutions and private persons.[113] There have been no contributions yet of recipient countries, i.e. the fifteen countries in which the PVS pilot projects were run. However, for specific types of PVS evaluations contributions of the country evaluated could be considered in the future.[114]

So far, the main donors were the World Bank, USDA, UK, Switzerland, Japan, France, Canada and Australia. Prospective donors at this stage are the EC and other EU Member States.[115] No private donations have been made yet, however, in principle private donations are possible and will be aimed at in the future.[116] In the following table an overview of the Fund sources is given.

Table 12: Donors' contributions to World Animal Health and Welfare Fund

Funds from donors (US$) as at August 31, 2007 (received and announced contributions)	
World Bank (over 3 years)	3,000,000
USA (USDA)	2,411,026
UK (DFID) (over 3 years)	1,021,992
Switzerland	408,114
Japan	7,698,794
France	3,266,160
Canada (CIDA and CFIA) (over 3 years)	10,449,082
Australia (AusAID and DAFF) (over 3 years)	1,907,850
Total Contributions	**30,163,048**

Source: OIE (2007). The OIE World Animal Health and Welfare Fund.

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[111] OIE (2006). International agencies join forces to advise OIE animal health and welfare fund. Retrieved at February 13, 2007, from: http://www.oie.int/eng/press/en_061101.htm

[112] OIE. List of Countries to be evaluated with the OIE-PVS tool

[113] OIE (2004). Appendix to Resolution XVII, Article 3a,b

[114] Interview OIE

[115] OIE (2007). The OIE World Animal Health and Welfare Fund

[116] Interview OIE

4.2.4.2. Intervention rules

In principle all OIE Member Countries are eligible to receive financing. However, in several cases donors earmark their contribution by defining benefiting countries/regions. For example, a substantial part of the 2006 donation of Japan was earmarked for the procurement of laboratory equipment in South-East Asia.[117]

Although rapid response to emergencies is not the main focus of the World Animal Health and Welfare Fund, specific measures can be implemented in a short period. An example of this is the Avian Influenza virtual vaccine bank for African countries, which was established to rapidly assist infected countries who would have to vaccinate poultry populations at risk and also countries not yet infected wishing to count with a strategic stock to protect themselves.[118] Funding related to the virtual vaccine bank can be released in three days.[119]

So far, 21.3 million doses of Avian Influenza vaccines for adult poultry were provided to seven African countries, of which 14 million doses were delivered to Egypt, 300,000 doses to Mauritius, 1 million to Mali, 1 million to Senegal, 1 million to Togo, 2 million to Mauritania and 2 million to Ghana.

One of the main activities carried out by the Fund in the area of capacity building for national Veterinary Services, as identified as one of the Strategic Areas in the fourth OIE Strategic Plan[120], is the development of the "Performance, Vision and Strategy" (PVS) instrument. The PVS tool is designed to facilitate the identification of areas of improvement to bring national Veterinary Services into compliance with the OIE quality standards. It is intended to help them to prevent and control animal diseases more effectively and/or to demonstrate to their trading partners that the health certificates issued by them are supported by reliable procedures.[121]

At the 2006 meeting of the advisory committee, the three main categories of countries interested in PVS evaluations were highlighted as follows:

1. A self-evaluation of the Veterinary Services of a country with respect to the OIE criteria with a view to assessing the current status and strengthening the appropriate areas of Veterinary Services and/or obtaining the financing and necessary support for their development from their government;

2. An evaluation in relation to bilateral negotiations between trading countries: it may be performed at the request of either country;

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[117] OIE (2006). Grants, Subsidies and Donations received in US$

[118] OIE (2007). OIE provides African countries with 21,300,000 doses of AI vaccines for poultry protection against H5N1. Retrieved at July 04, 2007, from: http://www.oie.int/eng/press/en_070704.htm

[119] The virtual bank is based not only on physical stocks of vaccines but also on commitments from the provider to deliver vaccines when needed. This avoids vaccine loss due to lapsing expiry dates.

[120] OIE (2005). The Fourth OIE Strategic Plan, p13

[121] OIE (2006). Resolution XXXV

3. Less developed countries looking for external resources: An evaluation performed as part of an international financing request, financed by a donor or other funding agency.[122]

More than a diagnostic tool, PVS is a process oriented towards the future, which can be used in passive or active mode, depending on the level of interest and commitment by the users and the official service in improving their national services over time.[123] For a PVS evaluation, an official request from the government is a prerequisite.[124]

The Fund also financed the following economic studies:

- Economic impact of diseases and Cost-Benefit Analysis of Improved Disease Prevention and Rapid Control;
- Feasibility Study on the setting up of a Global Emergency Response Fund for Animal Epizootics and Zoonoses in developing and in countries in transition;
- Pre-Feasibility Study on Market-Based Insurance Products for Emerging and Re-emerging Animal Disease Losses not Covered by Public Compensation. [125]

Other ongoing, or carried out, activities in the field of capacity building are:

- Training of the trainers within Veterinary Services;
- Regional training seminars for policy makers, mainly focused on rights and obligations of member countries in accordance with the WTO-SPS Agreement;
- Training of evaluators for the use of the PVS instrument for evaluation of countries wishing to improve their Avian Influenza and other relevant diseases prevention and control systems.[126]

The following table contains a budget breakdown of the activities:

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[122] OIE (2006). The OIE World Animal Health and Welfare Fund

[123] OIE (2006). Performance, Vision and Strategy (PVS): A Tool for Veterinary Services, p7

[124] OIE (2006). Minutes of the First Meeting of the Advisory Committee, p4

[125] This report is one of the Deliverables of the studies commissioned. For more information on the Terms of Reference of the studies see: OIE (2006). Call for Tender on Economic Studies relating to The Financing of Animal Epizootics and Zoonoses Losses in Developing and in Transition Countries. Retrieved at September 05, 2006, from: http://www.oie.int/eng/Services/AO/en_ao.htm?e1d12

[126] OIE (2006). Minutes of the First Meeting of the Advisory Committee, p4

Table 13: Overall breakdown of commitments at May 31, 2007

Activity	Cost (US$)
Procurement of laboratory equipment	6,378,504
Pilot PVS Evaluations	1,776,442
Capacity Building through OIE-RR/SRR	1,720,109
Coordination (3 years)	817,146
High Level Meetings	480,768
PVS Trainings	612,933
Other	704,766
Total	**12,490,668**

Source: OIE World Animal Health and Welfare Fund

A detailed accounting system has been established in 2006 to distinguish the expenditures to be derived from the World Fund and those attributed to the OIE General Budget or the Regional Representation.[127]

4.2.4.3. Governance

The Governance of the Fund is ensured by the general OIE governance mechanism: International Committee (the General Assembly of the official representatives of the 170 Member Countries); the elected Administrative Commission, two auditors *(Commissaires aux comptes)*; internal audit and an external auditor elected by the General Assembly. Within the OIE's general accounting system, a specific accounting system dedicated to the World Fund is in place; this allows regular reporting to a specific Management Committee of the World Fund.

"The Director General shall ensure that the Fund is managed in accordance with the financial rules of the OIE and the objectives fixed by the activity programme. [He] shall be assisted by a Management Committee, chaired by the President of the International Committee of the OIE or in his absence by the Vice President […]. [T]he Management Committee shall comprise the President and two members designated by the Administrative Commission of the OIE and chosen from among its own members. Representatives of donor bodies may be invited to participate in the work of the Management Committee in a consultative capacity."[128]

In addition, to support and guide the OIE in using this Fund, an Advisory Committee of the World Fund, made up of representatives from the main intergovernmental organisations sharing common objectives (WTO, FAO, WHO and OIE) and representatives from the major donors to the Fund and observers has been set up. The main purposes of the Advisory Committee are:

1. To examine the work program and priority activities conducted and to provide recommendations for future activities;

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[127] OIE (2007). Minutes of the First Meeting of the Management Committee, p4

[128] OIE (2004). Appendix to Resolution XVII, Article 4a,b

2. To comment and provide recommendations on the basis of outcomes achieved;
3. To examine and comment detailed accounts on actual expenses;
4. To build alliances between the OIE, other intergovernmental organisations and donors in the field of animal health, including zoonoses;
5. To identify parallel investments being made, ensure effective coordination and to avoid duplication with other programs on the basis of investments made or foreseen;
6. To identify opportunities to leverage funding or additional donors potential.[129]

In general there are no overheads for coordination activities financed from the Fund. Otherwise a maximum of 7% is charged (5% for larger grant/activities) to donor contributions. Approximately two fulltime equivalent posts (plus part time involvement of OIE management and accounting services) are used for the management of the fund.[130]

4.2.4.4. Strengths and weaknesses (as perceived by the fund)

Strengths

Strengths as perceived by the World Animal Health and Welfare Fund are;

- Simple procedures and low management fee;
- Cost effective because experts of national Veterinary Services usually don’t charge a fee when working for the OIE;
- Good opportunity for coordination with donors;
- Global outreach to regional services and collaborating centres.

Weaknesses

A weakness is that the Fund has been relatively recently established.

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[129] OIE (2007). Minutes of the First Meeting of the Management Committee, p3

[130] Interview OIE

Table 14: Main characteristics of the OIE World Animal Health and Welfare Fund

Introduction	
Name of fund	World Animal Health and Welfare Fund
Type of fund/hosting organisation	OIE
Emergency covered	Control of animal diseases, including those affecting humans, and the promotion of animal welfare and animal production food safety.
Targeted countries/regions	OIE Member States, focusing on developing and transition countries.
Capital of fund/ budget	The total of received donations at August 31, 2007, was US$ 22 million.
Contributions to fund in 2005	Not applicable, as fund became operational in 2006.
Mobilisation of funding	
Contribution of donors	Main donors to date are World Bank, USDA, UK, Switzerland, Japan, France, Canada, and Australia.
Contribution of eligible countries	Currently no contribution of recipient countries, e.g. for PVS evaluations. However, for specific types of PVS evaluations contributions of the country evaluated could be considered in the future.
Contribution of private sector	No private donations so far, however in principle private donations are possible and will be aimed at in the future.
Management of fund's risk	Not applicable, as the Fund is not primarily focused on emergency measures.
Intervention rules	
Eligibility criteria for recipients	In principle all OIE Members are eligible, however, donors in several cases earmark their contributions.
Co-financing requirements	Currently no co-financing requirement
Required institutional arrangement at the national level	Beneficiaries of the vaccine bank should have a national emergency preparedness plan / national emergency vaccination programme in place. PVS evaluations are only carried out at the request of the country concerned and corresponding report has to be cleared by the country after OIE peer review.
Funding limits for recipients	Not applicable
Rapid response mechanism	Emergency is not the main focus of the Fund although specific measures can be implemented in a short period
Types of costs / losses covered	Not applicable
Incentives for risk-reduction	Not applicable
Procedural steps to trigger payments	Request from the country (e.g., PVS evaluation, delivery of vaccines). Receipt of invoice corresponding to budgeted action / contract
Monitoring of payments and expenditures	OIE accountability procedures. Within the OIE's general accounting system, a specific accounting system dedicated to the Fund is in place. Two auditors *(Commissaires aux comptes)*; internal audit and annual external audit. External evaluation planned in 2008
Governance	
Supervisory body	Management Committee and Advisory Committee
Number of employees managing fund	Approximately 2 fulltime equivalent posts plus part time involvement of OIE management and accounting services
Administrative costs	No overheads for coordination activities financed from the Fund. Otherwise a maximum of 7% is charged (five percent for larger grants/activities)
Role of beneficiary countries	Not applicable

Role of donors / multilateral agencies	One Donor representative at the Management Committee. Max. 12 Donors representatives at the Advisory Committee and WTO, WHO, FAO and WB
Roles of other stakeholders	Possible observer status at the Advisory Committee

Source: Civic Consulting/OIE

4.2.5. FAO Special Fund for Emergency and Rehabilitation Activities

The Special Fund for Emergency and Rehabilitation Activities (SFERA) is a fund of the Food and Agricultural Organization of the United Nations (FAO). It was agreed to set up the Fund at the 102nd Session of the FAO Finance Committee in May 2003. At this session the need was recognized "for ready access to substantial funds to meet emergencies."[131] The purpose of SFERA is to enable FAO "to rapidly initiate emergency operations by participating in inter-UN agency needs assessment and coordination activities, establishing an Emergency Coordination Unit (ECU) related to agricultural assistance with the necessary logistical equipment, preparing a programme framework and projects, and providing advance funding when a donor's commitment has been obtained for procurement of inputs."[132]

The Fund consists of three components: Working Capital Component, Revolving Fund and Programme Component. In detail, the three components are as follows:

- Working Capital Component: The working capital component is to advance funds to rapidly initiate project activities before donor funds on agreed projects are received, with the funds then being transferred back to the SFERA on receipt;
- Revolving Fund: The revolving fund is to support FAO efforts in needs assessment, programme development and early establishment of an emergency coordination unit;
- Programme Component: The programme component is to support specific emergency crises. The programme component was used in January 2005 in response to the Indian Ocean tsunami disaster and further developed as a result of the spread of Avian Influenza from November 2005.[133]

When SFERA was established, a target funding of US$ 2 million was set. However, during a 2004 FAO Council meeting the need for increasing both scope and target funding of the SFERA was recognized. Here the overall funding level for the revolving category was increased to at least US$5 million, and that for the working capital component to US$15 million.[134] Since its inception in May 2003, the SFERA has received 47 million US$ (as at 30 June 2006). The working capital component consisted of approximately US$ 12 million at the end of 2006.

4.2.5.1. Mobilisation of funding

There are no formal criteria for contributing to SFERA. Many major donors contribute, however so far the EC and USAID have not contributed to SFERA. SFERA has received contributions from some eligible countries (Jordan, China and Saudi Arabia). No private sector contributions were received for SFERA. The FAO would be interested to invite donors from this sector, too. In the following table an overview of the Fund sources are given.

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[131] FAO Finance Committee (2003). Proposal to Establish a Special Fund for Emergency and Rehabilitation Activities (Hundred-and-second Session), p.2. Retrieved at January 23, 2007, from: http://www.fao.org/DOCREP/MEETING/006/Y8994E.HTM

[132] FAO Finance Committee (2003). Proposal to Establish a Special Fund for Emergency and Rehabilitation Activities (Hundred-and-second Session), p2. Retrieved at January 23, 2007, from: http://www.fao.org/DOCREP/MEETING/006/Y8994E.HTM

[133] FAO Finance Committee (2006). Annual Report on Special Fund for Emergency and Rehabilitation Activities. (Hundred and Fifteenth Session), p.3. Retrieved at January 23, 2007, from: ftp://ftp.fao.org/docrep/fao/meeting/011/j8139e.pdf

[134] FAO Council (2004). Advance Funding for Emergency and Rehabilitation Activities (Hundred and Twenty-seventh Session of the Council), p.4. Retrieved at January 23, 2007, from: http://www.fao.org/docrep/meeting/008/j3631e.htm

Table 15: SFERA – overview of contributions

Funds from member countries (US$) as at 30 June 2006	
Sweden	10,015,796
Norway	7,111,615
France	5,930,420
Finland	3,895,476
Switzerland	3,696,573
Germany	1,303,687
United Kingdom	1,113,000
Saudi Arabia	1,000,000
Canada	809,454
Australia	59,325
Jordan	50,000
Total Members	**34,985,346**
From TCE Direct Operating Costs	12,000,000
World Bank	17,293
Total Received	**47,002,639**

Source: FAO Finance Committee (2006). Annual Report on Special Fund for Emergency and Rehabilitation Activities. (Hundred and Fifteenth Session). Retrieved January 23, 2007, from: ftp://ftp.fao.org/docrep/fao/meeting/011/j8139e01.pdf

As soon as a donor contribution is confirmed in writing, advance funding for procurements of inputs required to protect or to restart agricultural production are made. Thereby the four to six weeks are saved that are normally taken to transfer funds to FAO's bank account.[135]

In order to manage the risk of treating conditional commitments as firm commitment, the FAO Finance Committee adopted an approach and summarised the factors relevant to evaluating and limiting the risks from taking action on a firm but conditional commitment of funds as follows:

- The amount of the advance to be made based on the conditional donor commitment;
- The time before final, unconditional approval is expected;
- The feasibility of terminating the operations so funded or of securing alternative funding in case of default;
- The amount and status of other, similar advances outstanding;
- The total remaining of uncommitted SFERA funds;

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[135] FAO Finance Committee (2005). Utilization of the Special Fund for Emergency and Rehabilitation Activities (Hundred and tenth Session), p2. Retrieved at January 23, 2007, from: ftp://ftp.fao.org/docrep/fao/meeting/009/j5943e.pdf

- Other prospective advance funding requirements, repayments of advances and receipts from donors in the foreseeable future.[136]

However, experience suggests that problems with "firm" but conditional commitments will be very rare, as disbursements made have been quickly repaid. Outstanding amounts are only for the most recent emergencies.[137]

4.2.5.2. Intervention rules

There are no formal criteria that recipients need to meet. The recipient government has to request assistance from the FAO and there needs to be a prospect to develop a significant response of the FAO in the country.[138]

Except contributions from unspent budget of closed projects (i.e. approx. US$ 0.8 million since the inception of the Fund), SFERA donations have been earmarked by donors for specific programmes. In the three years since SFERA started its operations, the Fund received over US$ 47 million, of which US$ 10 million were earmarked by donors for the tsunami programme and US$ 24.2 million for the campaign against the spread of Avian Influenza.[139]

SFERA does not provide direct payments to recipient governments, as the aim of SFERA is to finance the FAO response in the countries. Therefore no structure is required except a sufficient representation of FAO in the country.[140] This also means that there is no limit to the payments of funding. SFERA is mainly a rapid response mechanism, with the three components working complementary to address the needs in emergency situations. In some cases, for example Avian Influenza, there are also some longer-term interventions financed from the Fund.[141]

The procedures to trigger payment are simple. The FAO representative or operational officer in charge of a specific country contacts the SFERA fund management at the Emergency Operations and Rehabilitation Division (TCE) at FAO headquarters in Rome. The requests will be screened and the Director of the TCE Division will make a decision on basis of a brief analysis (the decision process could take as little as half a day).

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[136] FAO Finance Committee (2006). Flexible Use of the Special Fund for Emergency and Rehabilitation Activities (Hundred and thirteenth Session), p2. Retrieved at January 23, 2007, from: ftp://ftp.fao.org/docrep/fao/meeting/010/j7532e.pdf

[137] FAO Finance Committee (2005). Utilization of the Special Fund for Emergency and Rehabilitation Activities (Hundred and tenth Session), p6. Retrieved at January 23, 2007, from: ftp://ftp.fao.org/docrep/fao/meeting/009/j5943e.pdf

[138] Interview FAO

[139] FAO Finance Committee (2006). Annual Report on Special Fund for Emergency and Rehabilitation Activities. (Hundred and Fifteenth Session), p.3. Retrieved at January 23, 2007, from: ftp://ftp.fao.org/docrep/fao/meeting/011/j8139e.pdf

[140] Interview FAO

[141] Interview FAO

4.2.5.3. Governance

The supervisory body is the FAO Finance Committee, the members of which come from 11 countries elected every two years from among the FAO member states. The committee meets twice a year and reviews, among other duties, also SFERA operations. The number of full time employees to manage the fund consist of approximately 10 % of one professional full time post and in addition one full time support staff. The administrative staff costs are absorbed by the FAO Emergency Division. No deduction is made from the amounts advanced to projects in anticipation of receipt of donor contributions (However, for the implementation of projects 10 % are subtracted for project support costs in line with general FAO rules).

Innovative aspects of the Fund include:

- Working capital component allows FAO actions as soon as there is a formal donor decision;
- SFERA enables FAO to finance need assessment missions using both internal and external experts, or join assessment missions together with other UN Agencies and partners if possible.[142]

4.2.5.4. Strengths and weaknesses (as perceived by the fund)

Strengths

Perceived strengths of SFERA are:

- Quick response: Without SFERA it would not have been possible for the FAO to respond quickly to emergencies such as the locust problem, Tsunami, and Avian Influenza;
- Flexibility: This Fund allows flexibility for the FAO to adjust activities to the realities on the ground within the overall framework of the programme.[143] SFERA "has contributed to FAO's track record in the field, showing that FAO is able to respond when needed".[144] "The SFERA has allowed a programmatic approach to an emergency when donors have agreed to pool funding under the SFERA. This has reduced transaction costs for FAO and donors, and greatly improved FAO's flexibility in responding to a crisis."[145]

Weaknesses

- Financial tracking for donors is required and sometimes donors insist on separate reports, which in these cases increases the administrative effort.

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[142] Interview FAO

[143] Interview FAO

[144] FAO Finance Committee (2006). Annual Report on Special Fund for Emergency and Rehabilitation Activities. (Hundred and Fifteenth Session), p4. Retrieved at January 23, 2007, from: ftp://ftp.fao.org/docrep/fao/meeting/011/j8139e.pdf

[145] FAO Finance Committee (2006). Annual Report on Special Fund for Emergency and Rehabilitation Activities. (Hundred and Fifteenth Session), p5. Retrieved at January 23, 2007, ftp://ftp.fao.org/docrep/fao/meeting/011/j8139e.pdf

Table 16: Main characteristics of the FAO Special Fund for Emergency and Rehabilitation Activities

Introduction	
Name of fund	Special Fund for Emergency and Rehabilitation Activities (SFERA).
Type of fund/hosting organisation	Fund established by resolution of the governing bodies of FAO with separate accounting, but on the books of FAO regular or core programme.
Emergency covered	Emergencies requiring significant external assistance within the mandate of the FAO. SFERA can thus quickly field a needs assessment mission or establish rapidly an emergency coordination unit for agricultural assistance and to prepare a programme framework, and advance funding for procurement of inputs required to protect or restart agricultural activity, once donor support confirmation is received.
Targeted countries/regions	Any emergency project would be eligible for an advance from SFERA, however since its establishment SFERA has focused mainly on ca. 15 affected countries in Asia and Africa.
Capital of fund/total programme budget	Since its inception in May 2003, the SFERA has received 47 million US$ (as at 30 June 2006).
Contributions to fund in 2005	Approx. 18 million US$ from programme contributions plus approx. 0.5 million US$ from unspent budget of closed projects.
Mobilisation of funding	
Contribution of donors	There are no formal criteria. Many major donors contribute, however EC and USAID have so far not contributed to SFERA.
Contribution of eligible countries	There is no obligation for recipient countries to contribute. SFERA has received contributions from some eligible countries (Jordan, China and Saudi Arabia).
Contribution of private sector	None. In principle, FAO would be interested to invite donations from this sector, too.
Management of fund's risk	Criteria have been established for managing the risk of treating conditional donor commitments as firm commitments. Also, a maximum advance amount was adopted (which so far has never been reached). The main risk faced is that an advance would not be repaid. This is covered by not approving advances unless there is a signed agreement with a donor to provide contributions.
Intervention rules	
Eligibility criteria for recipients	The recipient government has to request assistance from the FAO and there needs to be a prospect to develop a significant response of the FAO in the country.
Co-financing requirements of recipients	None
Required institutional arrangement at the national level	No direct payments are provided for recipient governments, as the aim of SFERA is to finance the FAO response in the countries. Therefore no structure is required except a sufficient representation of FAO in the country.
Funding limits for recipients or recipient countries	Except contributions from unspent budget of closed projects (i.e. approx. US$ 0.8 million since the inception of the Fund), SFERA donations have been earmarked by donors for specific programmes or geographic regions.
Rapid response mechanism	SFERA is mainly a rapid response mechanism. But in some case, for example AI, there are also some longer-term interventions financed through earmarked contributions to the fund.
Types of costs / losses covered	Not applicable (see above).
Incentives for risk-reduction	Not applicable (see above).

Procedural steps to trigger payments	The FAO representative or operational officer in charge of a specific country contacts the SFERA fund management at the Emergency Operations and Rehabilitation Division (TCE) at FAO headquarters in Rome. The requests will be screened and the Director of the TCE Division will make a decision on basis of a brief analysis.
Monitoring of payments and expenditures	FAO accountability procedures
Governance	
Supervisory body	The supervisory body is the FAO Finance Committee, in which a total of 11 countries are represented.
Number of employees managing fund	Approximately 10 % of 1 professional full time post, and in addition 1 full time support staff.
Administrative costs	The administrative staff costs of SFERA are absorbed by the FAO Emergency division. No deduction is made from the amounts advanced to projects in anticipation of receipt of donor contributions. (However, for the implementation of projects 10 % are subtracted for project support costs in line with general FAO rules.)
Fund management innovations	Working capital component allows FAO actions as soon as there is a formal donor decision. The Fund enables FAO to finance need assessments using both internal and external experts, or joint assessment missions together with other UN Agencies and partners if possible.
Role of beneficiary countries	None
Role of donors / multilateral agencies	Donors have a general oversight responsibility exercised through the FAO Finance Committee.
Roles of other stakeholders	None

Source: Civic Consulting/FAO

5. Global institutional framework for the financing of costs and losses of epidemic livestock diseases

5.1. Overview of current external financing of epidemic livestock disease costs and losses

Comprehensive data on financing of costs and losses of outbreaks of epidemic livestock diseases and related preparedness/prevention measures in developing countries is scarce. The best-documented case is related to the recent outbreaks of Avian Influenza (see Part I). An overview of the donor commitments for Avian and Human Influenza indicates that in terms of commitments bilateral donors have by far the largest share. Multilateral development banks AfDB, AsDB and World Bank as well as the European Commission are also major donors, accounting for nearly one third of total commitments. Individual countries are the largest group of recipients, with international organisations receiving a share of less than 20%. Multilateral global trust funds currently play only a limited role, although an increasingly relevant one. For example, the World Bank managed multi-donor financed AHI facility receives a share of approximately 5% of total commitments.[146]

5.1.1. Multilateral global funds/facilities

Two operational global funds/facilities with a significant focus on animal health have already been described in detail in the previous section, namely the World Animal Health and Welfare Fund (WAHWF) of the OIE and the Special Fund for Emergency and Rehabilitation Activities (SFERA) of the FAO. Other relevant global funds/facilities include:

- Avian and Human Influenza Facility (AHIF, World Bank);
- Standards and Trade Development Facility (STDF, Facility's Secretariat at WTO);
- UN Central Fund For Influenza Action (CFIA, administered by the UNDP).

Budget details and description of the funds are provided in the following table:

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[146] Based on figures from World Bank Avian and Human Influenza, Update on Financing Needs and Framework, November 30, 2006; World Bank, Avian and Human Influenzas Multidonor Financing Framework: Second Update Session 2.4 on Implementation of International Assistance, Bamako International Conference December 6-8, 2006. The picture may be partly distorted, as the share of "other/unallocated" commitments is rather high (28%).

Table 17: Overview of animal health related global funds/facilities[147]

Name	Hosted/ managed by	Budget in million US$	Description of fund/facility
Avian and Human Influenza Facility (AHIF)	World Bank	US$ **86** m (total of pledged commitments as of 30.06.2007)	Purpose is to minimize the risk and socio-economic impact of Avian Influenza (and other zoonoses) and of possible human pandemic influenza in developing countries lacking adequate domestic resources and capacity to prepare for and combat any onset of the disease. Specifically, it consists of a multi-donor financial framework designed to fill those financing needs and gaps that remain unmet from the loan, credit and grant assistance being made available from other sources.
World Animal Health and Welfare Fund (WAHWF)	OIE	US$ **30.2** m (total of contributions 31.08.2007)	The purpose of WAHWF is to control animal diseases, including those affecting humans, and to promote animal welfare and animal production food safety. WAHWF focuses on good governance in the veterinary sector, by supporting the Veterinary Services of developing countries to meet OIE international standards on quality.
Special Fund for Emergency and Rehabilitation Activities (SFERA)	FAO	US$ **47** m (total of contributions 30.06.2006)	A multi-donor trust fund hosted by the Food and Agricultural Organization of the United Nations (FAO). The purpose of SFERA is to enable FAO to rapidly initiate emergency operations by participating in inter-UN agency needs assessment and coordination activities, preparing a programme framework and projects, and providing advance funding when a donor's commitment has been obtained for procurement of inputs.
Standards and Trade Development Facility (STDF)	Facility's Secretariat at WTO	US$ **10.4** m (Contributions received by June 2007)	Global programme in capacity building and technical assistance to assist developing countries in trade and SPS measures. The STDF is both a financing and a co-ordinating mechanism. It provides grant financing for developing countries seeking to comply with international SPS standards and hence gain or maintain market access.
UN Central Fund For Influenza Action (CFIA)	Adminis-tered by the UNDP	Target size of US$ **30** m (fund was created in November 2006).	The Fund serves as a complementary means through which external support can be made available for use by UN system agencies and their partners. The Fund's resources will be used when activities essential for the fulfilment of objectives set out in the UN System Consolidated Action Plan are not being adequately funded or when unforeseen urgencies arise.

Note: Not including regional funds/facilities.

A common feature of these global funds/facilities is their recent date of establishment. The oldest of the funds is the Standard and Trade Development facility, which was set up in 2002, followed by the SFERA (2003), the WAHWF (2004), AHIF and CFIA (both in 2006). The Avian Influenza crisis led not only to a significant increase of attention regarding animal health issues, but also to the declared intention of donors to better co-ordinate their initiatives. As the table above illustrates, activities funded by the above mechanisms differ significantly:

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[147] Sources: AHI Facility. Retrieved March 1, 2007, from: http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTHEALTHNUTRITIONANDPOPULATION/EXTTOPAVIFLU/0,,contentMDK:20917407~pagePK:64168445~piPK:64168309~theSitePK:1793593,00.html; WAHWF: OIE (2006), Ensuring good governance to address emerging and re-emerging animal disease threats. Retrieved March 1, 2007, from: http://www.oie.int/downld/Good_Governance/A_good_gouvernance.pdf; SFERA: FAO Finance Committee (2006), Annual Report on Special Fund for Emergency and Rehabilitation Activities. (Hundred and Fifteenth Session), p.3. Retrieved January 23, 2007, from ftp://ftp.fao.org/docrep/fao/meeting/011/j8139e.pdf; STDF: www.standardsfacility.org/donors.htm, retrieved in September 2007. CFIA: UN System Influenza Coordination (UNSIC), Final Narrative and Financial Report 1 January 2006 – 31 December 2006, World Bank Avian and Human Influenza, Update on Financing Needs and Framework, November 30, 2006

- The WB Avian and Human Influenza Facility (AHIF) aims at minimizing the risk and socio-economic impact of Avian Influenza (and other zoonoses) and of possible human pandemic influenza in developing countries lacking adequate domestic resources and capacity;
- The OIE World Animal Health and Welfare Fund (WAHWF) focuses mainly on improving veterinary governance, e.g. by conducting PVS evaluations in developing and transition countries to provide a basis for upgrading it, and other activities in the field of animal health;
- The FAO Special Fund for Emergency and Rehabilitation Activities (SFERA) focuses on emergencies requiring significant external assistance within the mandate of the FAO, reaching from animal health related emergencies (such as Avian Influenza) to locusts and the Tsunami response;
- The Standards and Trade Development Facility (STDP) with its secretariat hosted at the WTO concentrates on capacity building and technical assistance to assist developing countries in trade and SPS measures.

Another important difference is the degree to which funding is provided to external recipients from these funds/facilities: The SFERA is mainly an internal instrument of contingency financing to allow for a rapid response of the FAO, including through the provision of in-house or external expertise, procurement of necessary equipment or supplies etc. No funds are transferred to recipient governments. Also the UN Central Fund For Influenza Action (CFIA) is a pooled funding mechanism for a coordinated UN response, “enabling the UN and subsidiary stakeholders to access funding rapidly”.[148] The WAHWF mainly addresses activities conducted by the OIE, its regional representations and its cooperating partners (partly with external expertise), e.g. by conducting PVS evaluations, training seminars, conferences etc., creating arrangements for the emergency provision of vaccines and supporting activities of developing countries in these areas.

On the other hand, AHIF and STDF are mainly mechanisms to provide project-based funding to eligible external recipients. For example, organisations eligible for STDF funding include public sector and private sector entities as well as non-profit NGOs with expertise in the SPS area.[149] AHIF provides grants which can be executed by various recipients, including recipient governments, non-governmental organizations, international or regional organizations, and other partners. [150] As a source of co-financing for the GPAI (see below), funds from the AHIF are also relevant for direct support to compensation payments to farmers affected by the culling of poultry related to outbreaks of Avian Influenza. For example, the Afghanistan Avian Influenza Control & Human Pandemic Preparedness & Response Project, which is funded under the GPAI, also envisages a 2.4 million US$ grant from the AHIF for a compensation facility.[151]

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[148] For more information see Terms of Reference for a UN Central Fund For Influenza Action (CFIA)

[149] http://www.standardsfacility.org/who_apply.htm

[150] Avian and Human Influenza Facility, http://siteresources.worldbank.org/INTTOPAVIFLU/Resources/AHI.Facility.Rocio.May07.pdf

[151] World Bank (2006c)

5.1.2. Multilateral development banks

Multilateral development banks are a crucial part of the current global institutional framework for the financing of costs and losses of epidemic livestock diseases. The most important financial mechanism both in terms of scope and resources is the Global Program for Avian Influenza (GPAI) of the World Bank. It allows for the use of up to 500 million US$ in IBRD loans or IDA credits or grants for new projects, or restructuring of existing projects with or without additional financing over the next years. The program was endorsed in January 2006 as an adaptable loan program, which can be applied across countries as needed. Countries can access funding to strengthen their veterinary and health services to deal with Avian Influenza outbreaks among animals; minimize the threat posed to people; and prepare for, and respond to, any potential human influenza pandemic. As of June 2007, the World Bank has approved financing of US$ 377 million for 40 projects in 45 countries.[152] The programme consists of four components, one of which is the Animal Health Component. In this component, four areas of activity have been defined for individual country projects, namely:

A. Enhancing HPAI Prevention and Preparedness Capability;

B. Strengthening Disease Surveillance, Diagnostic Capacity and Virus Research;

C. Strengthening HPAI Control Programs and Outbreak Containment Plans;

D. Improving Bio-security in Poultry Production and Trade.

Activity area C includes the sub-component “Targeting virus elimination at the source”, which allows for supporting control measures such as stamping out with compensation of farmers and movement controls. It is important to note that the GPAI Programme is the first major donor initiative to provide not only technical assistance for developing national compensation policies but to actually provide financial support for compensation of farmers in affected countries, also drawing on the resources of the AHIF (see above). The World Bank is acting under its policy framework for emergency operations, facilitating quick processing, and allows to a certain degree for retrospective financing of eligible activities, an additional element increasing the flexibility of programme implementation.

The Asian Development Bank is also a major donor of AHI related activities with US$ 79 million committed as of 31 October 2006. The African Development Bank had disbursed 3 million US$ until this date, 55% of commitments,[153] and has together with ECOWAS (the Economic Community of West African States) put in place an emergency fund to be able to provide any country of the sub-region with immediate financial assistance, should an outbreak occur.[154]

5.1.3. Regional initiatives

Initiatives regarding animal health/AHI response have also been taken by regional organizations, including by the:

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[152] www.worldbank.org, retrieved September 2007

[153] World Bank, Avian and Human Influenzas Multidonor Financing Framework: Second Update Session 2.4 on Implementation of International Assistance, Bamako International Conference December 6-8, 2006

[154] ALive, Avian Influenza Prevention and Control and Human Influenza Pandemic Preparedness in Africa, Assessment of Financial Needs and Gaps, Fourth International Conference on Avian Influenza, Bamako - Mali - December 6-8, 2006

- Association of South East Asian Nations (ASEAN);
- South Asian Association for Regional Cooperation (SAARC);
- African Union Inter-African Bureau for Animal Resources (AU-IBAR).

Regional organisations and partnerships in some cases also have their own financial instruments, including funds/facilities relevant for animal health. For example, the ALive platform, the Partnership for Livestock Development, Poverty Alleviation & Sustainable Growth in Africa, has its own trust fund (hosted by the World Bank). The ALive Multi-Donor Trust Fund is dedicated to supporting interventions to ensure quality operations at the national level in the livestock sector, and has also been identified to support interventions on AHI. Activities funded are meant to be complementary to those financed by bilateral funds and/or in addition to those financed by the World Bank AHIF. Eight million euros have been allocated in the Multi-Donor Trust Fund of ALive for this purpose.[155]

5.2. Assessment of the current global framework for the financing of costs and losses of epidemic livestock diseases

The analysis of the current global institutional framework for the financing of costs and losses of epidemic livestock diseases indicates significant progress during the last decade. There is more global coordination of donors and recipient countries, and there are an increasing number of multi-lateral financial initiatives and mechanisms, created mainly during the last few years. This is partly a response to the threat of Avian Influenza and other zoonoses, but also the consequence of an increased awareness for the need to have effective and efficient global mechanisms to address specific global problems or emergencies, as is evident in the re-definition of the UN CERF and the setting up of the Global Fund to Fight AIDS, Tuberculosis and Malaria. Other important developments regarding the financing of the global response to animal health threats are:

- There is growing attention for a need to provide financial resources for preventing epidemic livestock diseases, including by assessing and improving the quality of the Veterinary Services to create a more uniform implementation of animal health standards;
- Emergency response plans are increasingly prepared and implemented in many potentially affected countries to respond effectively in case of an outbreak of Avian Influenza with global financial (and technical) support;
- Vaccine banks are being established (such as the virtual AI vaccine bank of the OIE) that allow in case of outbreaks to respond rapidly with vaccination, therefore potentially reducing the need for large-scale culling operations that dramatically increase potential costs and losses;
- There is growing awareness for the need to compensate livestock holders in case of disease related culling. In 2006, for the first time global guidelines in this respect for developing countries have been developed[156] and the Global Programme for Avian Influenza is the first major donor initiative to provide financial support for compensation of farmers in affected countries.

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[155] Ibid.

[156] World Bank (2006a)

In spite of these positive developments, the global framework for the financing of costs and losses of epidemic livestock diseases is also characterised by significant shortcomings. Global efforts regarding Avian Influenza are in no way matched with respect to other diseases, although there have been longstanding programmes with a regional focus for other diseases (see Part I). Of course, some measures taken in the framework of AI emergency preparedness are also relevant for other epidemic livestock diseases, e.g. in the area of veterinary governance. But other measures are species-specific, such as the improvement of bio-security in production, and disease-specific, such as the development of vaccine banks. There is no globally coordinated effort to combat FMD that is anything like the AI response, even though it is likely that at least some of the past outbreaks in industrialised countries costing billions of US$[157] were caused by imports from third countries. A main deficiency therefore is:

- Limited global support: Currently there is hardly any global structure for the financing of animal disease risk management for highly contagious transboundary animal diseases in developing countries other than related to Avian Influenza. This may lead to the underfunding of measures to prevent outbreaks of highly contagious transboundary animal diseases and may delay adequate responses to emerging diseases.

Other deficiencies include:

- Fragmentation of donor response: The multitude of challenges posed by highly contagious transboundary animal diseases may require a multitude of answers depending, e.g. on regional circumstances, and therefore complementary actions by different donors on all levels are more than justified. However, this also leads to a certain fragmentation and does not provide an answer to the inherent challenges of the animal disease risk, namely its cumulative nature (see below, section 5.3), which would require a system to cope with the resulting highly volatile funding needs caused by outbreaks of various sizes.
- Inefficiencies caused by lack of incentives for prevention: Little incentives are provided for developing countries to prevent crises by improving their Veterinary Services and their animal health status, except where major importing countries provide a clear perspective for lifting of veterinary restrictions on imports and possibly also provide financing for related technical assistance. Veterinary restrictions in case of outbreaks by major importing countries and related losses of export revenue can even be the source of strong adverse incentives for affected livestock industries and governments that may lead to delayed reporting of disease outbreaks or to a lack of implementation of proper surveillance measures. The lack of incentives for prevention and the existence of adverse incentives can be expected to lead to significant inefficiencies, as large-scale disease outbreaks in the past have indicated.[158]
- No consistent policy on cost-sharing with farmers: Only few countries (and mostly these are developed economies) have a consistent policy to share responsibility and costs related to outbreaks of animal diseases between government and livestock sector, which is a major incentive to upgrade bio-security in livestock production and also contributes to a financially sustainable animal health system.

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[157] The FMD-outbreak in the UK in 2001 showed the devastating consequences of this disease. It caused total losses of more than 13 billion € to the UK economy, according to government estimates, see Civic Consulting (2006)

[158] For a detailed discussion, see Civic Consulting (2006)

These deficiencies indicate the extent of the challenge to develop an efficient global institutional framework to finance epidemic livestock disease risk.

5.3. Objectives of an efficient global framework for financing costs and losses of epidemic livestock diseases

Managing animal health risk requires first of all awareness and actions at the farm and local level, and it is therefore a legitimate question whether any global mechanism is needed at all to address the risk posed by animal diseases. The financing of risk costs is usually not a task of public institutions, be it at the national or global level. Regarding animal disease risk however, this is different. Arrangements for the financing of costs and losses of disease outbreaks strongly influence risk management activities undertaken by farmers and other stakeholders, which again determine the severity of animal disease risk. Hence the set-up of the animal disease risk financing system is a key element of developing an animal health policy aiming at efficiently managing animal disease risk. To do this, the interdependencies between stakeholders' activities and animal disease risk have to be fully understood.

Epidemic livestock disease risk has two main characteristics; both of them have far-reaching consequences for risk financing (for a more detailed discussion see Annex 2).

- Firstly, there is a *strong interference of stakeholders' behaviour and risk*, which causes externalities of risk management. When individual livestock farmers decide about implementing prevention and control measures, they mainly take into account costs and benefits accruing directly to them. They do not necessarily consider costs and benefits accruing to third parties. For example, individual animal producers have a significant influence on the overall costs of a disease outbreak originating on their premises, since their decision to early report the disease to the authorities could make the difference between a local and immediately contained disease outbreak and a global animal health crisis.[159] Similarly, risk management undertaken by institutions of a given country, e.g. the Veterinary Services, the police, agricultural and health ministries, farmers' and traders' associations, do not only affect animal disease risk of this country. Their performance in containing outbreaks may determine whether the disease spreads to other countries or not, disrupts trade or even leads to a global pandemic. An economic consequence of these externalities is that animal disease risk management decisions are not efficient when based on costs and benefits of the decision maker, be it an individual farmer or the government of a specific country. It is therefore important to analyse cost and benefits of animal disease risk management from a global perspective and to decide which measures should be undertaken at an international level, and which at other levels, to ensure that all benefits are taken into account. In order to induce efficient animal disease risk management, a system for financing costs and losses of epidemic livestock diseases has to provide incentives for individuals and national institutions to enhance risk management.[160]
- The second key characteristic is the *cumulative nature of animal disease risk*. Animal disease risk is an accumulation risk (see Part III). Once an outbreak occurs, the disease can spread to other

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[159] See Gramig et al (2006), p44 for the correlation between total costs of animal disease outbreaks and the duration of disease outbreaks, which strongly depend on the effectiveness and rapidity of control measures

[160] This issue is further discussed in sections 6.3 and 6.4

> animals through infection. Accumulation is a typical feature of catastrophe risk. Despite a large number of individual risks, e.g. animals or herds, there are no pooling effects when individual risks are aggregated in a portfolio of risks, i.e. costs and losses of the risk portfolio would be highly volatile. That means that although the probability is high that global animal disease risk realisation is moderate compared to what could happen in a worst-case scenario, there is a small probability that the realisation of animal disease risk is catastrophic, i.e. that numerous large-scale disease outbreaks or even global animal disease crises happen. This complicates the subject of financing costs and losses of epidemic livestock disease outbreaks, since the need for funds is highly volatile. A system for financing costs and losses of epidemic livestock diseases should provide a mechanism to cope with this problem.[161]

From the discussion of the characteristics of epidemic livestock disease risk the following primary objective can be deducted for an efficient global framework for financing costs and losses of epidemic livestock diseases:

1. **To mobilize and allocate financial resources for epidemic livestock disease prevention and control in affected countries, where this is needed and appropriate for an efficient global response, while creating incentives for prevention at all levels and providing a mechanism to cope with the highly volatile nature of animal disease risk;**

An efficient global framework, however, cannot work by just concentrating on a financing mechanism, as the allocation of resources has to aim at adhering to certain animal health standards. The allocation has further to take into account to which degree these standards are actually implemented, and the flow of resources obviously depends on where outbreaks actually occur, leading to a need for surveillance and reporting systems. Finally, as developing and transition countries may lack absorption capacity for the resources provided, there is a need to provide technical assistance where needed. This underlines the interrelationship between the objective of an efficient global framework for financing costs and losses of epidemic livestock diseases and the functioning of an overall global framework for animal health. Additional objectives of the overall global framework for animal health which are relevant in this context therefore include:

2. To establish guidelines and rules for efficient animal disease risk management;
3. To monitor disease status and effectiveness of animal disease risk management of countries;
4. To provide technical assistance for epidemic livestock disease prevention and control, in countries where this is needed and appropriate for an efficient global response.

It has to be stressed that an efficient global institutional framework for the financing of costs and losses of animal diseases depends to a significant degree on adequate standard setting, surveillance and technical assistance, areas in which a large number of global initiatives are ongoing (see Part I). However, in line with the Terms of Reference of this study the discussion only concerns the external financing of the global institutional framework, in so far as it relates to emergency preparedness and response.[162] However, as the analysis of deficiencies of the current global framework has shown, it is still a significant challenge to develop an efficient global institutional framework to finance epidemic livestock disease risk, which addresses the limitations regarding mobilization and allocation of financial resources for epidemic livestock disease prevention and control for diseases other than AI, creates incentives for prevention at all levels and provides a mechanism to cope with the highly volatile nature of animal disease risk.

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[161] Relevant strategies are analysed in section 6.8 and Annex 1.

[162] The other phases of the disease management cycle, i.e. general prevention/mitigation and recovery/rehabilitation will not be discussed in detail, as these fall out of the scope of the study. It has, however, clearly to be underlined that an efficient

5.4. Possible role for a Global Emergency Response Fund for Animal Epizootics

It does not seem very likely that it would be possible to improve the current financing of animal disease risk management purely through better coordination of the bilateral donor community. The reason for this is that there needs to be a party that is ultimately taking and managing the animal disease risks agreed upon with eligible countries, which will require considerable efforts and innovative approaches for risk management to be able to fulfil the agree commitments (see section 6.6). It seems unlikely that any individual donor would be willing to take this responsibility. This clearly indicates the need for a new global mechanism for the financing of animal disease risk management. **This could either be developed by extending the mandate of an existing fund/facility, for example developed in the framework of the AI crisis, or by creating a new instrument. For the aim of this analysis this question is not of significance, as the operational rules (developed in section 6 of this report) would be expected to be applied independent from the mechanism chosen and the hosting organisation(s).**

The role of a Global Emergency Response Fund for Animal Epizootics (GERFAE) in the global institutional framework for animal health recommended here is to fill this identified gap and support activities aiming at reducing the adverse consequences of a disease outbreak, focusing on improving emergency preparedness planning and emergency response measures. Both are key aspects to effective and efficient animal disease risk management. Especially emergency response planning as part of the preparedness process is crucial for the rapid implementation of emergency measures (see section 6.1).

Effective and efficient emergency preparedness and emergency response need to be planned, financed and carried out. In an attempt to further specify the role of GERFAE in the global institutional framework for animal health, it is necessary to determine in which of these processes GERFAE participates and, if applicable, how GERFAE is involved. As mentioned above, the wider global framework for animal health has to fulfil functions that are indispensable for an efficient and effective response to any given outbreak of a relevant disease, including the setting of standards, and technical assistance, where there is a wide body of experience at key organisations such as the FAO, OIE, World Bank, regional programmes and, last not least, bilateral donors, that form the backbone of development cooperation in the area of animal health. Therefore, developing emergency preparedness and emergency response standards and technical assistance to implement them should as general principle *not* be performed by GERFAE, but by other appropriate institutions of the global animal health framework. **GERFAE would therefore mainly be a financial instrument**.

The ultimate goal of the global institutional framework for animal health, i.e. effectively and efficiently managing animal disease risk, has to be seen in the light of the prevailing capability for animal disease risk

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management of global animal disease risk has implications for all phases of the disease management cycle and support to general prevention measures, for example, can in many instances be an efficient measure, as has been analysed in depth in Part I.

management in developing and transition countries; some of them may even lack the most basic qualifications for effective disease prevention and control. Thus GERFAE's role in a global animal health context is also to induce an improvement of emergency response capacities among the least developed countries with regards to animal disease risk management by committing conditional financial support to eligible countries based on pre-defined and costed country emergency response plans. The fund will take into account countries' capacities of managing animal health risk and aim at a step-by-step improvement of emergency preparedness and emergency response capabilities in countries with poor competences in animal disease risk management. However, the financial support of GERFAE would focus on providing financial support on basis of these plans after an outbreak takes place. It would not provide funds for implementing emergency preparedness and prevention measures in times without outbreak, as to reduce overlap with existing mechanisms and to focus on its main task of managing disease risk more efficiently.[163]

The new instrument GERFAE (or the existing fund/facility with an extended mandate) would therefore be different from existing mechanisms regarding the following aspects:

- It would focus on all eligible animal diseases, that by their nature require global intervention (see section 6.1.3);
- It would focus on providing a financial mechanism for eligible developing countries to cope with the highly volatile nature of animal disease risk;
- The financial support provided would be conditioned as to create incentives for prevention at all levels;
- Its operational rules would take into account best practices from developed, transition and developing countries to enhance control of eligible animal diseases, including through compensation of livestock holders, while preventing the creation of adverse incentives through overcompensation.

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[163] The only emergency preparedness measure GERFAE could finance is the preparation of pre-defined and costed country emergency response plans, see a detailed discussion in section 6.1.4.1.

6. Recommendations for main operational principles for a Global Emergency Response Fund for Animal Epizootics

6.1. Principles of GERFAE

6.1.1. Rationale

A Global Emergency Response Fund for Animal Epizootics and Zoonoses (GERFAE) would be an important element of an efficient global framework for animal disease risk management. This is the conclusion of the previous section of this study, which assessed the need for and the possible role of such a fund. GERFAE would provide eligible countries with immediate funding for an emergency response to outbreaks of epidemic livestock diseases. Options for setting up such a global emergency response fund will be defined in the following sections on basis of a set of guiding principles. These guiding principles were derived from the Terms of Reference, discussions with the OIE, other relevant organisations and stakeholders, as well as an analysis of best practices.

Suggested guiding principles for a Global Emergency Response Fund for Animal Epizootics and Zoonoses (GERFAE) would include:

I. **The fund will encourage an effective and rapid emergency response for control of epidemic livestock diseases, *including through compensation of livestock holders*:** The fund shall encourage a high level of preparedness and, in case of an outbreak of relevant epidemic livestock diseases, control measures that are coordinated, rapid and simple to implement.

II. **The fund will function as a financial instrument, not as an implementing body:** The fund is a financing instrument to provide emergency funding for control measures and compensation payments to livestock holders under a pre-established framework and response plan. Financial support provided by the fund will take into account that resources to respond to an emergency should be provided as much as possible from domestic and existing bilateral or multilateral sources.

III. **The fund will promote efficient global animal disease risk management:** The global emergency response fund will deploy financial resources where needs and financing gaps are highest, and expected benefits of measures are largest. It will promote measures that minimise total costs and losses of epidemic livestock disease outbreaks over time, taking into account the costs of these measures.

IV. **The fund will focus on diseases that pose a threat to "global public goods":** The global public interest in managing risks associated with a particular animal disease depends on the possible public health, animal health and/or economic impacts of an outbreak. The global emergency response fund will therefore focus on livestock diseases that pose a threat to "global public goods", e.g. zoonoses such as AI or other highly contagious transboundary animal diseases.

V. **The fund will provide incentives for prevention and early reporting:** The global emergency response fund will provide incentives that are designed to encourage risk-reducing behaviour of all parties involved, including national and local governments and livestock operators.

VI. **The fund will safeguard ownership of the emergency response by the affected countries:** Countries affected by an outbreak of an epidemic livestock disease should have ownership of the emergency response process and support from the global emergency response fund will be provided accordingly.

VII. **The fund will encourage sharing responsibilities and costs to the extent possible:** The financing of the emergency response has to reflect the responsibilities of the parties involved. The costs of disease control, eradication and emergency preparedness should be shared as much as possible, taking into account social aspects, i.e. affordability and social consequences.

This leads to the following recommendation for setting up a global emergency response fund:

1. ***A Global Emergency Response Fund for Animal Epizootics and Zoonoses (GERFAE) would be an important element of an efficient global framework for animal disease risk management.*** It should operate on basis of guiding principles that include:

- The fund will encourage an effective and rapid emergency response for control of epidemic livestock diseases, *including through compensation of livestock holders*;
- The fund will function as a financial instrument, not as an implementing body;
- The fund will promote efficient global animal disease risk management;
- The fund will focus on diseases that pose a threat to “global public goods”;
- The fund will provide incentives for prevention and early reporting;
- The fund will safeguard ownership of the emergency response by the affected countries;
- The fund will encourage sharing responsibilities and costs to the extent possible.

6.1.2. Purpose and objectives

A global emergency response fund would be created to assist eligible countries in implementing an emergency response for control and/or eradication of epidemic livestock diseases, when domestic and existing bilateral or multilateral donor resources are insufficient.

The **purpose** of GERFAE would be to provide timely funding for a coordinated, effective and rapid emergency response to outbreaks of epidemic livestock disease for developing and transition countries lacking adequate domestic resources and capacity to combat the outbreaks.

The **specific objectives** of GERFAE would therefore be:

a) Relevant epidemic livestock disease outbreaks brought under control and/or eradicated in eligible countries;

b) Increased emergency preparedness planning concerning epidemic livestock diseases.

These objectives could be in principle achieved by two different approaches:

- *Approach A: Providing financial support to emergency response and related planning.* GERFAE would provide financial support to eligible countries in case of an outbreak of a relevant epidemic livestock disease to implement a rapid emergency response and provide financial support for emergency response planning in times without outbreaks;

- *Approach B: Providing financial support to emergency response only*. GERFAE would provide financial support to eligible countries in case of an outbreak of a relevant epidemic livestock disease to implement a rapid emergency response only. Global financial support for emergency response planning will be provided through other sources/mechanisms.

Both approaches will be analysed in the following sections. Other approaches that will not be considered are the following:

- Providing support to emergency response only, i.e. providing funds without appropriate prior emergency preparedness planning. The reasons for the need of a linkage between emergency preparedness and response are discussed in section 6.1.4.1.[164]

- Providing financial support also to general prevention and recovery measures. The reason is that these measures fall out of the scope of the study.

The overall budget of GERFAE is likely to be inadequate to cover all outbreaks of epidemic livestock disease for developing and transition countries lacking adequate resources and capacity. Therefore under both Approach A and Approach B a set of eligibility criteria has to be developed, that define whether in principle a disease, measure/activity and country is eligible for support. These are explored in the following sections. It goes without saying that even if all eligibility criteria concerning specific measures are fulfilled, budget limitations are likely to require difficult choices in allocating GERFAE's resources, that have to be facilitated by a transparent decision making process and an appropriate governance structure (see section 6.4).

6.1.3. Eligible diseases

In line with the guiding principles a global emergency response fund should focus on those livestock diseases that pose a threat to "global public goods", depending on the possible impacts of the diseases on public health, animal health and the wider economy. To employ this principle, diseases have to be categorised according to objective and transparent criteria. The following criteria can be considered relevant to categorise livestock diseases at a global level:

- The public relevance of a disease;
- The need for global coordinated action;

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[164] The exclusion of this approach means in consequence, that GERFAE would not provide funds to countries on an ad-hoc basis, without prior planning process (see discussion of eligibility criteria in section 6.1.5). Although this may result in bitter decisions, this is a needed limitation as otherwise the incentives for eligible countries to do proper emergency planning would be reduced.

- The character of a disease as relevant emerging risk.

The *public relevance* of animal diseases relates to the possible impacts of a disease outbreak and consequently the public benefits involved with disease risk management.[165] The most important factors determining the impacts of diseases are:

1. *Contagiousness:* The more contagious a disease is, the higher the overall economic impact of an outbreak can be. A striking example is FMD which is considered an extremely contagious disease. The virus can be air-, soil-, animal- or equipment-borne and survive for long periods in meat and non-pasteurised dairy products.

2. *Public health impact:* Public benefits of animal health risk management also depend on whether diseases can affect human health or not. If a disease poses a threat to public health significant public benefits are associated with disease prevention, control and containment. This is most dramatically illustrated by the example of Highly Pathogenic Avian Influenza (HPAI), a contagious animal disease that potentially could lead to a human flu pandemic.

3. *Other factors:* There can be other disease characteristics that can lead to significant impacts on animal health/welfare, food security, and the wider economy. For example, if a disease is notifiable according to OIE rules, an outbreak may lead to severe animal and animal product trade disruptions with associated economic consequences (for recent examples see Part I).

Outbreaks of epidemic animal disease may therefore require public intervention, which – in line with the guiding principles – should be financed at the lowest appropriate level. Also, depending on disease characteristics, the geographic area affected by disease outbreaks will differ. Accordingly, prevention and control efforts have to be coordinated in institutions that are the best suited to cover the entire geographic area potentially affected by a disease outbreak. For certain diseases an outbreak would potentially only have economic and/or public health impacts that are regionally limited. For other diseases an outbreak could potentially have global public health and/or economic impacts or other characteristics of the disease could require global coordinated action. This ultimately leads to the categories "diseases with need for global coordinated action" and "diseases without need for global coordinated action" among the diseases classified as publicly relevant.

Taken together, the criteria *public relevance of a disease* and the *need for global coordinated action* are quite similar to the definition of transboundary animal diseases. Transboundary animal diseases (TADs) are "those [diseases] that are of significant economic, trade and/or food security importance for a considerable number of countries; which can easily spread to other countries and reach epidemic proportions; and where control/management … requires cooperation between several countries."[166] Examples of significant TADs include:

- Foot-and-Mouth disease (FMD);
- Rinderpest (RP);
- Contagious bovine pleuropneumonia (CBPP);

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[165] See Civic Consulting (2006)

[166] Otte et al. (2004)

- Bovine Spongiform Encephalopathy (BSE);
- Rift Valley Fever (RVF);
- Peste de Petits Ruminants (PPR);
- Classical Swine Fever (CSF);
- African Swine Fever (ASF);
- Newcastle Disease (ND);
- Avian Influenza (AI).

The difference between the criteria for disease categorisation and the definition of TADs is mainly the aspect of regional vs. global need for action. For TADs a transboundary cooperation of several countries is required and may in some cases be sufficient, whereas under the criteria developed above (in line with guiding principle IV) only those diseases would be considered as being eligible under the global emergency response fund where a global coordinated response is needed. In some cases, however, even diseases that only have a regional impact may require global attention when financial resources for emergency response measures are not sufficiently available in the affected region. This is the case when there are clear indications for a risk of global impact if adequate disease control measures are not taken at a regional level.

Another criterion for disease categorisation is the question on whether a disease is an *emerging disease* or not. According to the OIE Terrestrial Animal Health Code, an emerging disease "means a new infection resulting from the evolution or change of an existing pathogenic agent, a known infection spreading to a new geographic area or population, or a previously unrecognised pathogenic agent or disease diagnosed for the first time and which has a significant impact on animal or public health."[167]

Many major global health scares of recent decades, for example BSE, SARS, Avian Influenza, were caused by animal diseases that had been qualified as an emerging disease at the time.

Based on these categorisation criteria a global emergency response fund could have separate windows to support the (rapid) emergency response regarding outbreaks of the following diseases (in order of priority):

> *Category 1 - Highest priority:* Emerging livestock diseases of high public relevance with a need for global coordinated action (i.e. *all* diseases fulfilling all three categorisation criteria);
>
> *Category 2 - High priority:* Other priority epidemic livestock disease(s) of high public relevance with a need for global coordinated action (i.e. *selected* diseases fulfilling the first two of the three categorisation criteria, namely public relevance and need for global action). This category may include endemic diseases that are considered a priority;
>
> *Category 3 – Exceptional support:* Under-funded diseases of high public relevance with a need for regionally coordinated action, where countries in the affected region lack adequate domestic resources and capacity to combat the outbreaks when there are clear indications for a risk of global impact if adequate disease control measures are not taken at the regional level (i.e. selected diseases fulfilling only the first of the three categorisation criteria, namely public relevance).

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[167] OIE (2006a), chapter 1.1.1

The reasons to assign different priorities for support to these diseases are as follows:

Category 1: As a global emergency response fund will have limited resources compared to overall need is advisable to focus efforts on where they make the biggest difference, as is the case with emerging diseases with significant potential impacts and a need for global action.

Category 2: It is unlikely that a global emergency response fund would have the resources needed to address the significant number of TADs having a high public relevance and where there is a need for global coordinated action. It would, however, also not be appropriate to only intervene regarding emerging diseases, as a global response may in some cases also be needed for diseases such as FMD, that are endemic in some regions, to prevent major trade disruptions. Therefore the governance mechanism of a global emergency response fund would have to define and regularly update a shortlist of priority epidemic livestock diseases that would be eligible for support.

Category 3: A global emergency response fund should generally not intervene regarding diseases that only have a need for regionally coordinated action, as this is more appropriate to be financed at a regional level by relevant actors. However, in exceptional cases affected countries may lack adequate domestic resources and capacity to combat the outbreaks and there are clear indications for a risk of global impact if adequate disease control measures are not taken, e.g. by causing regional economic or civil instability. In these cases GERFAE could also intervene, if appropriate resources are available and a decision by the Governing Board is taken in this respect (see sections 6.2, mobilisation of funding, and 6.4 governance).

This leads to the following recommendation for setting up a global emergency response fund:

2. ***Eligible diseases, that may trigger support of GERFAE in case of an outbreak, should be determined on basis of the following criteria***:

- The public relevance of a livestock disease;
- The need for global coordinated action;
- The character of a livestock disease as relevant emerging risk.

Depending on the available resources a global emergency response fund could have separate windows to support the emergency response regarding outbreaks of the following diseases (in order of priority):

- *Category 1: Emerging livestock diseases* of high public relevance with a need for global coordinated action;
- *Category 2: Other priority epidemic livestock disease(s)* of high public relevance with a need for global coordinated action;
- *Category 3: Under-funded diseases* of high public relevance with a need for regionally coordinated action, where countries in the affected region lack adequate domestic resources and capacity to combat the outbreaks and there are clear indications for a risk of global impact if adequate disease control measures are not taken.

6.1.4. Eligible measures

The "disease management cycle" consists of four phases, namely:

I. *Prevention/mitigation;*

II. *Emergency preparedness;*

III. *Emergency response;*

IV. *Recovery.*

The relevant phases with respect to the operation of a global emergency response fund are mainly phases II and III, i.e. emergency preparedness and emergency response. Global financial support to general prevention and recovery measures are not considered here, as these are out of the scope of the study.

6.1.4.1. Emergency preparedness

The need for a linkage between the financial support to emergency response measures by GERFAE (see next section) and emergency preparedness measures taken by recipient countries arises from both effectiveness and efficiency considerations:

- *Effectiveness:* The effectiveness of an emergency response depends to a significant degree on the level of preparedness at an operational level reached before the onset of the emergency to enable a swift and timely response, as has been emphasised again in the Report of the Tsunami Evaluation Coalition and is also emphasised by a recent FAO/OIE case study of the Magaria outbreak of Avian Influenza in Niger.[168]

- *Efficiency:* Preparedness measures including emergency response planning are likely to reduce the costs of outbreaks of livestock diseases, including costs of culling and compensation and losses due to business interruption and loss of export markets (see Part I). An appropriate level of emergency preparedness and a linkage between emergency preparedness and emergency response is therefore part of an efficient global animal disease risk management (principle III).

For the following analysis it is therefore assumed that global financial support is available for emergency preparedness measures, provided either from GERFAE (Approach A) or through other *global* sources/mechanisms (Approach B).

Emergency preparedness measures / activities (phase II of the disease management cycle) mainly relate to *emergency response planning, financial preparedness, preparation of infrastructure,* and *training*:

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[168] Tsunami Evaluation Coalition (2006); Le Brun, Y. and Fermet-Quinet, E. (2006)

Box 1: Main emergency preparedness measures (pre-outbreak)

Emergency response planning

- Strategic planning (incl. linkage to general disaster preparedness)
- Developing compensation protocols
- Developing protocol for determining a suspected outbreak
- Communication planning

Financial preparedness

- Preparation of Country Compensation Mechanism
- Setting up contingency funds/budget lines

Preparation of infrastructure

- Preparation of laboratory infrastructure for emergencies,
- Setting up of vaccine banks, if appropriate
- Equipment for field teams
- Census and registering of herds, including setting up of appropriate databases

Training

- Training of field teams (culling, disposal, disinfection, vaccination),
- Simulation exercise

Most important from the GERFAE perspective is appropriate emergency response planning, for the following reasons:

- *Financial planning and management:* Emergency response planning in recipient countries will lead to easier financial planning, management and oversight for GERFAE as the costs of predefined plans and responsibilities can be estimated to a certain extent. This may allow for better definition of funding limits per emergency if necessary given the overall resources available to GERFAE;

- *Transparency:* Emergency response planning in recipient countries will provide transparency and prevent confusion as to what GERFAE can or cannot fund and the responsibilities of other stakeholders later in the emergency response phase. This can be expected to contribute to a more efficient emergency response with a greater chance of success at a reduced cost.

Both arguments indicate the advantage of Approach A, under which GERFAE would also directly (co-)finance emergency response planning, as this would allow for the easiest feedback loops between recipient countries and GERFAE. Emergency preparedness measures other than emergency response planning should not financially be supported from GERFAE, as giving financial support to more comprehensive prevention measures could dilute the emphasis on proper emergency preparedness planning. The implementation of other emergency preparedness measures (based on the emergency planning supported by GERFAE) should be financed from other sources. It can be expected that bilateral donors, for example, will be much more likely to support specific projects, such as the improvement of the diagnostic laboratory infrastructure, when this is based on a sound emergency response plan. Therefore, Approach A could potentially catalyse and mobilise additional financial resources for emergency preparedness, even when only planning activities are supported directly by GERFAE.

In principle Approach B is also feasible, under which GERFAE would not contribute to emergency response planning, as long as other appropriate global mechanisms provide financial support for emergency response planning and it is safeguarded that the needed information on the emergency response planning is provided to GERFAE. Without this type of linkage, however, Approach B could not be considered, as there would be insufficient data for financial planning and management for GERFAE and the allocation process in case of an emergency would be likely to be inefficient and not transparent.

This leads to the following recommendation for setting up a global emergency response fund:

3. ***Emergency response planning for outbreaks of relevant livestock diseases has to be (co-)financed by GERFAE (Approach A) or through other appropriate global mechanisms (Approach B).*** The analysis indicates the advantage of Approach A, under which GERFAE would also directly (co-)finance emergency response planning, as this would allow for the easiest feedback loops between recipient countries and GERFAE, which are needed for financial planning and management of the fund, and are likely to increase the transparency of the process. However, in principle Approach B is also feasible, if other appropriate global mechanisms provide financial support for emergency response planning and it is safeguarded that the needed information on the emergency response planning is provided to GERFAE.

6.1.4.2. Emergency response

Measures related to phase III of the disease management cycle (emergency response) include, for example:

Box 2: Main emergency response measures (post-outbreak):

Human resources:

- Recruiting and dispatching of specialized and trained field teams

Control measures:

- Stamping out (incl. culling, disposal, disinfection)
- Compensation
- Emergency vaccination (including procurement of vaccines),
- Testing and monitoring

Supporting measures:

- Communication
- Confinement
- Quarantine
- Zoning
- Movement control (including control of wildlife)
- Data collection to ensure accountability regarding the number of animals culled, vaccinated, or amount of compensation given etc., including related audit procedures

The definition of emergency response measures eligible for support can be related to and guided by the following issues:

- Defining priority emergency measures;
- Defining the level of support and possible co-financing requirements for emergency measures;
- Defining performance criteria for emergency measures.

Priority emergency measures

As has been pointed out before (see section 5.3), an essential function of a global institutional framework for animal health is to establish standards, guidelines and rules for emergency response in case of disease outbreaks. In line with its character as a financial instrument GERFAE is not expected to fulfil this function, but is expected to use the relevant standards, guidelines and rules both in developing proper emergency response planning before an outbreak and in determining priority emergency measures after an outbreak of a relevant disease. The fund management under the guidance of the GERFAE Governing Board would aim to develop three categories of measures that are likely to be defined for each eligible disease separately. These are:

1. Emergency response measures that are always eligible for support;
2. Emergency response measures that are eligible for support only under specific conditions;
3. Emergency response measures that are not eligible for support at all.

This arrangement would create transparency for parties requesting support, and would at the same time provide guidance to the fund management. It would also allow for a better estimate of required resources in case of an outbreak and would provide crucial guidance for the developing and costing of emergency response plans for eligible countries. The alternative, namely to define eligible measures for each outbreak ex-post, would increase flexibility, but could be expected to increase the administrative effort and reduce the predictability concerning the resources required.

This leads to the following recommendation for setting up a global emergency response fund:

4. ***Categories of emergency response measures that are eligible for support from GERFAE should be defined specifically for each eligible disease and then referred to and stipulated within each country emergency response plan, namely:***

- Measures that are always eligible for support;
- Measures that are eligible for support only under specific conditions;
- Measures that are not eligible for support at all.

Level of support and co-financing requirements

There are several arguments in favour of a strict co-financing requirement (in cash or kind) for emergency response measures financed by external donors:

- A co-financing requirement is a classical approach used by other global funds[169] and also within the insurance sector to reduce or deter moral hazard. If, for example, a national compensation programme for farmers was to be exclusively financed by external donors, a recipient government might be tempted to overstate for political reasons compensation values for culled livestock. This problem would likely to be less relevant in case the recipient governments has to pay part of the bill from its own budget;[170]
- A co-financing requirement guarantees the ownership of the emergency response process by the recipient government (guiding criteria VI);
- A co-financing requirement leads to a sharing of costs (guiding criteria VII);

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[169] For example the Global Fund to Fight AIDS, Tuberculosis and Malaria. Other emergency funds such as the UN CERF do not apply co-financing requirements, however in these cases the problem of moral hazard is less relevant, as payments are directed to other UN bodies, and not to recipient governments.

[170] The same argument is, of course, also true for the payment of compensation by a recipient government to eligible farmers. For this reason, whenever possible, similar requirements have to be implemented in the compensation procedures, see section 6.3 below.

- A co-financing requirement reduces the overall amount of financial support required, or, alternatively, allows support for more measures than would have been the case without such a requirement.

On the other hand, there are also valid concerns regarding co-financing that are related to the practicability of this type of requirement:

- A co-financing requirement increases the administrative burden, as the contribution of the recipient government has to be documented and audited. This may increase transactions costs.
- A co-financing requirement may lead to delays in planning and response, if the recipient government does not have the required funds available when they are needed, e.g. for budgetary constraint reasons.
- A co-financing requirement may lead recipient governments to decline external assistance completely, for example in the case of low income countries, leading to a spread of disease with all related risks and costs.

In summary, these concerns relate to a possible *increase in administrative burden*, a possible *delay in the emergency response* and a possible *lack of resources of a recipient government*. Can these issues be addressed through appropriate arrangements?

The increase of the administrative burden is a serious concern and in fact experiences with programs requiring co-financing of disease control costs indicate in some cases a very significant administrative burden for recipient governments resulting from co-financing procedures. However, this is to a large extent caused by the specific definition of the co-financing requirements. For example, in the EU context the EU "Veterinary Fund" finances ex-post up to 50% of disinfection costs related to a disease outbreak as documented by the recipient government. It is clear that it is no small task to ensure a proper audit trail for the actual spending concerning a significant number of private companies contracted to disinfect various farms spread over the outbreak zone in a specific country. However, co-financing requirements could be defined in much simpler terms. Some measures financed by GERFAE will not require co-financing of the recipient government in cash, but in kind, such as the sending out of field teams for culling. Here documentation of the culling process and the number of staff involved would possibly provide sufficient evidence to document fulfilling the co-financing requirements. Also providing staff and premises for a national emergency management facility that would take over in case of an outbreak (see below) would be a contribution in kind to the emergency preparedness and response process that is relatively easy to monitor.

In other cases where a co-financing in cash could be required from the recipient government, such as for compensation payments to farmers, the disbursement process will in any case require thorough documentation and audit (see section 6.5), therefore the additional burden for documenting and auditing co-financing requirements may be less relevant. Whenever possible pre-defined flat rates could be used to calculate the GERFAE contribution to a measure. In all cases it is crucial that both GERFAE's contribution and the related co-financing requirements are defined in detail in advance in the country emergency response plan to increase transparency and allow for proper costing.

The possible delay in the implementation of emergency response measures caused by co-financing requirements could be addressed in two ways: The ideal approach is to stress the aspect of financial preparedness in preparing the country emergency response plan and include in the plan the setting up of specific earmarked national contingency funds/budget lines to cover expected co-financing requirements of the government, which mitigate the above aspects in addition to encouraging better government emergency planning and more comprehensive ownership of the process. The other possibility is that GERFAE in some cases pre-finances the contribution of the recipient country as a loan[171] at predefined conditions regarding the pay back period and the interest rate applied. In both cases emergency response measures would not be delayed and co-financing requirements would be adhered to.

Finally, the possible lack of resources of a recipient government could be addressed through the same mechanism. If the recipient country is in principle in a position to co-finance measures, the GERFAE loan for the co-financing share of the recipient country would have to be paid back in the agreed timeframe. In case the GERFAE Governing Board decides on basis of pre-determined criteria that a country is not in a position to finance its share fully (e.g. for specific low income countries), the loans could in exceptional cases be fully or partly converted to grants (i.e. would not be repayable).

This leads to the following recommendation for setting up a global emergency response fund:

5. ***In principle, all emergency response measures that are supported from GERFAE should be co-financed in kind or in cash by the recipient country.*** Co-financing requirements may differ for specific categories of emergency response measures and have to be pre-defined within each country emergency response plan to increase transparency and reduce the administrative burden related to documentation and audit. In case of a temporary lack of resources by the recipient country GERFAE could pre-finance the country-contribution on a loan basis at predefined conditions regarding the pay back period and the interest rate applied. For specific low-income countries, individually to be agreed by the GERFAE Governing Board, co-financing requirements would be waived or apply only to a limited extent.

Performance indicators for emergency response measures

By definition emergency response is only one phase of the disease management cycle and any support from GERFAE to specific measures has therefore to be limited in time. The question is whether there should be flexibility regarding the duration of support to specific measures or not? There are examples for setting very strict time limits. Funds from UN CERF received by grantees for rapid response must be committed within three months, for example. This is in line with purpose of CERF, which is not meant to replace traditional funding channels, but rather "to mitigate the unevenness and delays of the voluntary contribution system by providing seed money for core emergency humanitarian activities in the first three months of a sudden onset crisis"[172] (see section 4.2.1). Setting time limits has some advantages, such as providing incentives for implementing a rapid response and for involving other sources of funding. On the other hand, as the emergency response to livestock diseases is complex, it seems to be very difficult to apply strict timelines, especially as the cluster of organisations and donor programmes working in the veterinary field is much more limited than in the humanitarian field and in several cases no other organisation may be prepared to take over from GERFAE. To set any specific time limit across all measures would very likely result in an arbitrarily chosen restriction, whereas the main criteria needs to be whether control of an outbreak is achieved.

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[171] A comparable approach is taken by the Working Capital Facility of the WFP, which provides (internal) loans for the rapid implementation of emergency programmes on basis of forecast donor commitments, see section 4.2.3. Of course, providing this loans to recipient countries comes at a risk, because GERFAE would have limited leverage to enforce repayment, other than to withdraw further support.

[172] United Nations Office for the Coordination of Humanitarian Affairs 2006: Guidelines Central Emergency Response Fund (CERF) - Grant Component (this does not apply, however, for under-funded emergencies)

It is therefore recommended that in the country emergency response plan for specific disease outbreaks performance indicators are defined. A valuable source in this respect is the OIE PVS instrument, in which PVS indicators are given. An example for a performance indicator would be the percentage of livestock holders that were affected by culling measures and were subsequently compensated within a given time-window. Performance indicators would be pre-agreed between the recipient country and would be monitored by GERFAE. This would form the basis for possible continuation of GERFAE assistance after the initial emergency response. The pre-agreed indicators should also reflect the duties of the recipient countries as members of relevant organisations, such as the OIE, to minimise the risk of the spread of animal diseases and to prevent, through appropriate measures, related trade disruptions as much as possible. Indicators should include aspects such as:

- Degree of collaboration with relevant international institutions such as the OIE and the FAO, e.g. as reflected in the time lag between occurrence of suspicious disease cases and the time of reporting by the affected governments and the willingness to request external technical assistance from these organisations;

- Firmness of sanitary measures to control/eradicate the disease in the shortest period possible, as reflected for example in the degree to which the pre-agreed emergency response plan is implemented in practice.

This leads to the following recommendation for setting up a global emergency response fund:

6. ***Country emergency response plans for specific disease outbreaks should define performance indicators for specific emergency measures.*** Performance indicators should be pre-agreed between the recipient country and GERFAE and form the basis for decisions to be made on a possible continuation of GERFAE assistance after the initial emergency response. Indicators should also reflect the duties of the recipient countries as members of relevant organisations such as the OIE to minimise the risk of the spread of animal diseases, e.g. through early reporting of suspicious disease cases.

6.1.5. Eligible countries

GERFAE would be targeted at developing economies and economies in transition and should ideally contribute to an increased emergency preparedness of eligible countries. One mechanism to achieve this objective to define appropriate eligibility criteria for countries that wish to receive financial support from GERFAE. Five possible eligibility criteria are explored in this section:

- The requirement to have a pre-defined and costed country emergency response plan for relevant diseases and earmarked contingency funds, for example through national budget allocations, to co-finance these emergency response plans by countries that can financially contribute to emergency preparedness and response measures;

- The requirement to have a Country Compensation Mechanism in place to be eligible for support to compensation payments to livestock holders;

- The requirement to have conducted a PVS evaluation of the Veterinary Services and to develop a country strategy to upgrade Veterinary Service to address relevant deficits identified;

- The requirement to have a country emergency management facility in place that can coordinate measures in case of an outbreak (either specific for livestock disease outbreaks or for general emergencies);

- An upper limit relating to the level of development of a specific country, e.g. BIP/capita or any other appropriate indicator.

A pre-defined and costed country emergency response plan for relevant diseases seems to be a crucial and feasible eligibility criterion. As has been discussed above, it is a pre-condition not only for an effective and efficient response, but also for the transparent functioning of GERFAE. For those countries that can afford co-finance these plans, the additional requirement of earmarking contingency funds to partly finance emergency response measures can further catalyse and reinforce the contingency planning process and create local ownership.

The requirement to have a Country Compensation Mechanism in place to be eligible for support to compensation payments is based on best practices in many countries. It also emphasises local ownership of the process, increases accountability and reinforces pre-crises planning. This type of mechanism is especially relevant in countries that have a significant modern livestock sector. In these cases it typically involves the government and – to some extent and where existing – relevant stakeholder organisations. Examples of this type of schemes have been described in section 3. GERFAE should not provide funding to ad-hoc compensation schemes (see section 6.3 below).

The PVS-instrument is a tool to assess the quality of the Veterinary Services of a given country.[173] Currently, a significant number of OIE member states do not fulfil OIE minimum standards concerning the Veterinary Services, which increases the risk of livestock disease outbreaks and trade disruptions. The PVS instrument has been specifically developed to support countries by evaluating their Veterinary Services through an external expert team and provide a basis for developing a country strategy to upgrade Veterinary Service and address relevant deficits. A PVS evaluation of the Veterinary Services and a country strategy to address relevant deficits of its Veterinary Services seems to be a feasible eligibility criterion, especially in case the PVS evaluation is financed from outside sources.

The requirement to have a country emergency management facility in place that can coordinate measures in case of an outbreak, either specific for livestock disease outbreaks or for general emergencies, seems also to be both feasible and necessary. Such a facility has the potential to increase the overall effectiveness of the response while in the same time providing an opportunity for a more centralised chain of command, which has proven to be essential in the fight against, e.g. Avian Influenza. It is also a suitable measure to increase the ownership of the recipient country with respect to the emergency response and to provide co-financing in kind through the provision of staff and premises for the facility.

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[173] OIE (2006b)

Finally, there needs to be an eligibility criterion related to the income level of the recipient countries, as it is not the intention for GERFAE to support emergency response measures in developed countries that have a highly developed Veterinary Service and sufficient means to finance an appropriate emergency response. An appropriate maximum income level of eligible countries would have to be set in a transparent way with the aim to target countries most in need, while not excluding countries where a GERFAE intervention would make a difference. This issue is obviously of significant relevance for the operation of GERFAE, as the level at which the maximum income level is set determines the maximum number of eligible countries and the expected losses to be covered by GERFAE. This issue is further explored in section 6.2.

The above criteria would apply for countries that wish to receive financial support for *emergency response measures*. Eligibility criteria for financial support for *emergency preparedness planning* under Approach A would have to relate not to the existence of for example a country emergency response plan and an adequate management facility, but rather relate to a commitment of the country to introduce them.

This leads to the following recommendation for setting up a global emergency response fund:

7. ***It is recommended that countries have to fulfil a set of eligibility criteria to receive financial support for emergency response measures from GERFAE, namely:***

- To have in place a pre-defined and costed country emergency response plan for relevant diseases; and earmarked contingency funds to co-finance measures;
- To have a Country Compensation Mechanism in place to be eligible for support to compensation payments to livestock holders;
- To have conducted a PVS evaluation of the Veterinary Services and to develop and implement a country strategy to upgrade Veterinary Service to address relevant deficits identified;
- To have a country emergency management facility in place that can coordinate measures in case of an outbreak;

Finally, there needs to be an eligibility criterion related to the income level of the recipient countries, with a limit to be set in a transparent way with the aim to target scarce resources to countries most in need, while not excluding countries where a GERFAE intervention would make a difference.

Only in exceptional cases upon a decision of the Governing Board would GERFAE finance to a limited degree emergency response measures in specific low-income countries that do not fulfil the above mentioned criteria.

6.2. Mobilisation of funding

Initial soundings on the issue of mobilisation of funding have been undertaken with a number of potential donors including DFID in the UK, SIDA in Sweden, AusAID in Australia and relevant services of the European Commission. It should be noted from the outset that these informal soundings concerning GERFAE should not in any way be seen as a formal response from any of these organisations but they do highlight certain points:

1) It will be critical to ensure that the access point for a formal discussion on this issue is chosen with great care as there appears for the most part to be limited recognition in these broad ranging bodies of the desirability of achieving the *public good* of improved prevention and control of epizootics and zoonoses. More generally, amongst national donor agencies the desire to contribute to such a fund has to be viewed in the context of a permanent tension between – what are perceived as – the 'benefits' of bilateral support compared to support channelled through multilateral agencies.[174]

2) DFID[175] noted that it had several ongoing initiatives in the livestock sector the objective of which is to improve the livelihoods of poor livestock keepers. The view was taken that they would be more likely to respond to an initiative like GERFAE when countries had placed livestock sector development within their poverty reduction strategies. In this context it was recognised that Transboundary Animal Diseases were an important constraint to productivity and to accessing markets but there was concern that a new initiative might not adequately "address some of the fundamental policy and institutional constraints preventing existing Veterinary Services from effectively applying emergency preparedness plans. How do we enable the provision of basic Veterinary Services in rural areas, let alone TAD control?" It was also noted that complementary action was needed "to help the livestock industries in developing countries access markets once they've controlled diseases and outbreaks of diseases" and in this context it was pointed out that, "whilst hundreds of millions of euros have been spent on the control and eradication of Rinderpest, African farmers have not benefited from increased market access." Thus, it was deemed essential that disease control be driven by the powerful incentive of the prospect of increased sales and revenue for farmers and countries.

3) Beyond this, assuming the establishment of GERFAE were to be accepted there is the key issue of accountability. While donors are willing to accept a 'trust fund' managed by an intermediary such as the World Bank which 'signs off' on the accounts this may also be difficult to achieve. Thus, for example, Europeaid, the implementation arm of the EU's development policy is only willing to commit funds if the institution to which such funds are committed is considered to have financial rules equivalent to those of the Commission's own. Thus any body so established must be responsible for the utilization of funds and provide assurance of a proper audit trail. There is therefore the need to have a capacity to monitor and 'pre-vet' disbursements in a manner, which is acceptable to donors (see section 6.5 below).

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[174] Thus in January 2007 AusAID announced that it was contributing A$ 5 million to help ASEAN Plus Three countries "enhance regional preparedness for and capacity to cope with emerging infectious diseases such as avian influenza". This is part of AusAID's November 2005 commitment to contribute A$100 million over 4 years to combat the threat of pandemics and other emerging diseases within the region.

[175] Personal communication from Tim Leyland, International Animal Health and Agricultural Trade Standards Adviser, Renewable Natural Resources and Agriculture Team, Policy Division, Department for International Development (DFID), UK, January 2007.

4) Further issues (not in any particular order of importance) which were noted but not expanded on in discussions were the need to ensure that:

   - The funds must be of a sufficient order of magnitude to be ‘programmable’;

   - Recipient countries need to be involved on the basis of ‘partnership’ i.e. there needs to be a full buy in which will almost certainly mean national money has to be committed;

   - The funds must be clearly used for the purposes intended and donors must be able to participate in a relatively straightforward manner.

In terms of the scale of the required funds, the analysis undertaken in Part I on the potential costs of an outbreak is of relevance here. The table below indicates the total direct costs and losses of HPAI under the ‘most likely’ scenario.

Table 18: Estimated global impact of HPAI: direct costs and losses (a) (in ‘000 US$)

Impact: scenario 1 (most likely)				
	Value of culled poultry	**Culling/ Disposal costs**	**Control costs**	***Total direct disease losses and control costs (a)***
Global impact, annual (i)				
scenario A (ii)	4,271,540	747,519	320,365	*5,339,425*
scenario B (iii)	4,898,934	857,313	367,420	*6,123,668*
scenario C (iv)	7,763,260	1,358,571	582,245	*9,704,075*
Global impact, total (i)				
scenario A (ii)	8,543,080	1,495,039	640,731	*10,678,850*
scenario B (iii)	9,797,868	1,714,627	734,840	*12,247,335*
scenario C (iv)	15,526,520	2,717,141	1,164,489	*19,408,151*

Source: *“OIE Del1 global costs analysis.xls”*, Agra CEAS (1 March 2007)
(a) Includes animal value losses, culling/disposal and control costs.
(i) The 'global' impact is given in a range, depending on 3 scenarios in terms of country coverage (scenarios A to C). Furthermore, it is indicated per year and in total, depending on the assumptions for duration of the impact of the epidemic. In the ‘most likely’ scenario presented here the duration is assumed to be 2 years (based on experience of real outbreaks in the baseline).
(ii) Scenario A includes the following countries: Cambodia, China, Indonesia, Laos, Thailand, Vietnam, S. Korea; Mongolia, Kazakhstan, Russia, Turkey, Romania; Nigeria, Niger, Sudan.
(iii) Scenario B includes the countries of scenario A plus: N Korea, Malaysia, Brunei, Myanmar, Singapore, Philippines; Bangladesh, Bhutan, India, Nepal, Sri Lanka.
(iv) Scenario C includes all OIE developing country members (132 countries in total).

Under the ‘most likely’ scenario of this analysis, the total direct disease losses and control costs of an outbreak are estimated to range between US$ 5.3 billion in the case of scenario A (H5N1 infected countries), US$ 6.1 billion in scenario B (infected and non-infected at immediate risk countries), and US$ 9.7 billion in scenario C (all OIE developing country members),[176] calculated on an annual basis. Using the assumptions of the duration of the epidemic impact of the ‘most likely’ scenario (which assumes a 2 year impact period), then the direct impact of an HPAI outbreak is estimated to range between US$ 10.7 billion (scenario A), US$ 12.2 billion (scenario B) and US$ 19.4 billion (scenario C). All these costs exclude on-farm losses from business disruption.

In the particular case of LDCs (Least Developed Countries),[177] the costs are presented separately in the Table below.

Table 19: Estimated impact of HPAI for LDCs: direct costs and losses (a) (in ‘000 US$)

Impact: scenario 1 (most likely)				
	Value of culled poultry	**Culling/ Disposal costs**	**Control costs**	***Total direct disease losses and control costs (a)***
Impact on LDCs, annual (i)				
scenario A (ii)	58,080	10,164	4,356	*72,600*
scenario B (iii)	206,292	36,101	15,472	*257,865*
scenario C (iv)	467,749	81,856	35,081	*584,686*
Impact on LDCs, total (i)				
scenario A (ii)	116,160	20,328	8,712	*145,200*
scenario B (iii)	412,584	72,202	30,944	*515,730*
scenario C (iv)	935,497	163,712	70,162	*1,169,372*

Source: *“OIE Del1 global costs analysis.xls”*, Agra CEAS (1 March 2007); LDC definition based on UN ESC
(a) Includes animal value losses, culling/disposal and control costs. Excludes consequential on-farm losses.
(i) The 'global' impact is given in a range, depending on 3 scenarios in terms of country coverage (scenarios A to C). Furthermore, it is indicated per year and in total, depending on the assumptions for duration of the impact of the epidemic. In the ‘most likely’ scenario presented here the duration is assumed to be 2 years (based on experience of real outbreaks in the baseline).
(ii) Scenario A includes the following countries (LDCs): Cambodia, Laos, Niger and Sudan.

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[176] List of infected and non-infected at immediate risk of countries used in scenarios A and B respectively is based on the Global Strategy for the Progressive Control of HPAI and current status (OIE, WAHID). For full scenarios, assumptions and sources under each scenario see Part I, Annex 5.

[177] The list of LDCs is based on UN ESC.

(iii) Scenario B includes the countries of scenario A plus (LDCs): Bangladesh, Bhutan, Myanmar, and Nepal.
(iv) Scenario C includes all LDCs that are OIE developing country members (50 countries in total).

An analysis by country groups is of relevance because it was suggested in section 6.1.5 to introduce an income eligibility criterion, for example one that allows access only to LDCs. Under the most likely scenario, in the event of an HPAI outbreak the estimated direct impact (excluding consequential losses) for the LDCs as a group ranges from US$ 73 million per year in scenario A (only 4 LDCs affected) to US$ 258 million in scenario B (8 LDCs affected) and nearly US$ 600 million if all 50 LDCs were to be affected (scenario C).

The projections quoted above are estimates of total direct disease losses and control costs, and may not be equated with the financial need of GERFAE. Several factors influence the financial need of GERFAE, including:

- Income eligibility criterion concerning eligible countries;
- Eligible diseases;
- Eligible measures;
- Co-financing rate required;
- Compensation rates applied;
- Types of costs compensated.

Assuming scenario B prevails (i.e. an HPAI outbreak that touches the countries currently listed as infected and non-infected at immediate risk) and on basis of an average compensation rates at 75% and a co-financing rate for eligible countries of 50%, the total required annual budget for GERFAE regarding HPAI would amount to US$ 103 million for the LDCs affected under scenario B, or US$ 2.45 billion on a global level. This illustrates the need for decisions early on in the planning process regarding eligible disease and measures as well the income eligibility criterion for GERFAE.

It has to be underlined that the results above have to be interpreted with great care and the assumptions for each scenario, as well as the limitations of the model, have to be taken into account (see Part I). Capital needed to finance emergency response measures of GERFAE cannot be estimated easily. There may be years without any disease outbreaks in recipient countries, and periods with numerous and/or large-scale disease outbreaks, which would require significantly more funding from GERFAE. That means total capital outlays for emergency response measures during a given budgeting period are variable, and an elaborated system for managing the risk of the fund has to be developed (see section 6.6). In the mid-to long term, epidemiological models that can be used to provide information for parameters describing the spread of diseases and potential magnitude of disease losses in eligible countries have to be developed, that can be used to narrowing down the range of scenarios.

This leads to the following recommendation:

8. ***Decisions on the eligible countries, diseases and measures, the co-financing rate required; compensation rates applied and types of costs compensated have to be taken early on in the planning process of GERFAE, as this significantly impacts on the budget required.*** Due to the variability of capital requirements for emergency response measures during a given budgeting period, an elaborated system for managing the risk of the fund has to be developed.

6.3. Compensation of livestock holders

As discussed in section 6.1.5, countries eligible for GERFAE support for compensation payments to livestock holders are required to establish a Country Compensation Mechanism. Incentives of livestock holders to undertake risk management measures strongly depend on the principles according to which a Country Compensation Mechanism (CCM) operates. Therefore GERFAE should provide guidance for the operation of a CCM to ensure efficient animal disease risk management of livestock holders.

6.3.1. Effective and efficient risk management of livestock holders

6.3.1.1. What risk management of livestock holders is desired?

Before analysing how it can be achieved that livestock holders conduct effective and efficient animal disease risk management activities, it should be clarified what individual activities we refer to, i.e. what is the individual behaviour we would like to see among livestock holders. For that purpose we distinguish among four different individual risk management activities:

- Registration;[178]
- Prevention and bio-security;
- Early disclosure;
- Compliance with veterinary restrictions.

A precondition of being prepared for emergency situations and being able to immediately undertake appropriate risk management measures in crisis situations is that a Veterinary Service conceives where animals are kept in the country, how many animals, which species, and in which production system. That means Veterinary Services ideally need to have a database available providing that kind of information. Quick and reliable information transmission from Veterinary Service to livestock holders in emergency situations is much easier if livestock holders/establishments are properly identified. Locating eligible people and communicating their rights to them is also an important precondition for a compensation system to function properly.[179] Hence there are various reasons why a database of livestock holders/establishments, managed or accessible by a competent authority, has to be established; it is an important instrument of animal disease risk management. The development of this database and even more its administration requires active registration of livestock holders and their cooperation in keeping proper livestock inventory records. *Registration* is an issue in times without major outbreaks. For obvious reasons the entire Veterinary Service activity and capacity should be devoted to emergency response in a crisis situation, and a livestock census in such a situation may even increase the risk of disease spread.[180]

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[178] The term "registration" is here used as synonym to "identification of establishments/owners", which is a prerequisite for any system of animal identification and traceability, an important tool for animal health management in general. As Appendix 3.5.1 of the OIE Terrestrial Animal Health Code – 2006 points out, "[a]nimal identification and animal traceability (…) may significantly improve the effectiveness of: management of disease outbreaks and food safety incidents, vaccination programmes, herd/flock husbandry, zoning/compartmentalisation, surveillance, early response and notification systems, animal movement controls, inspection, certification, fair practices in trade and the utilisation of veterinary drugs, feed and pesticides at farm level." http://www.oie.int/eng/normes/mcode/en_chapitre_3.5.1.htm

[179] World Bank (2006a), p10

All kinds of *prevention and bio-security* activities are the second form of individual risk management which has to be mentioned here, e.g. maintaining good hygienic conditions on farms, fencing feedlots to avoid livestock contact with wild animals in regions with endemic diseases, etc. As GERFAE focuses on financing emergency response planning and emergency response measures only, prevention activities are not the central interest of this study. However guidelines for the operation of a Country Compensation Mechanism may have an effect on the willingness of livestock holders to conduct prevention and bio-security activities. Hence the operational guidelines developed here have to explicitly take into account the incentives they provide for prevention and bio-security.

The third form of individual risk management is *early disclosure*. This measure is universally critical towards effectively and efficiently managing animal disease risk. The term early disclosure comprises desired behaviour of livestock holders to regularly check the health status of their herds and immediately notify the Veterinary Service in case disease symptoms can be observed. As Gramig et al. (2006) noted,[181] "The importance of early disclosure of a disease outbreak or a suspected problem by a producer cannot be overstated." If an outbreak is reported immediately, a well functioning Veterinary Service has a chance to control and eradicate the disease quickly and to keep overall costs of the outbreak low.

Last but not least, livestock holders' *compliance with veterinary restrictions*, including emergency response measures, is an individual risk management activity to be considered here. To enable effective and efficient animal disease risk management, livestock holders have to refrain from importing animals into or exporting animals out of movement restriction zones, and they have to support emergency measures, e.g. cooperate with culling teams when the Veterinary Service instructs emergency culling. Although emergency response is governed by the Veterinary Services, the question of compliance is certainly one to be addressed here, since the operational guidelines of a Country Compensation Mechanism have an influence on the willingness of livestock holders to comply with veterinary restrictions.

6.3.1.2. How can risk management of livestock holders be achieved?

Animal disease outbreaks have serious consequences for livestock holders, e.g. animal losses, costly veterinary restrictions, decreasing demand for animal products, etc. Therefore efficient disease containment and eradication should be in the livestock holders' own interest. Despite of this, measures must be taken to ensure compliance of livestock holders, because individual risk management behaviour is costly for the individual livestock holder, and a large part of the benefits accrue to other individuals, who do not bear these costs. In economics this phenomena is referred to as externalities (see Annex 2). A very general result of economic analysis is that activities causing positive externalities are undertaken on an inefficiently low level if the decisions on these activities are made privately.[182] The reason is that private decisions are based on private cost-benefit considerations; hence external benefits are not taken into account. Externalities justify, from an economic point of view, to assess possibilities of market intervention, which aim at adjusting individuals' decisions towards efficiency.

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[180] Le Brun, Y., and Fermet-Quinet, E. (2006)

[181] Gramig et al. (2006), p44

[182] See Cornes et al. (2001), chapter 3

The most intuitive instrument to achieve that individuals undertake disease risk management measures is regulation. This simply means to establish legal standards that force individuals to undertake individual risk management activities, ideally on efficient levels. Regulation is widely used in any field where individual and collective interests may drift apart. Several preconditions have to be fulfilled however so that regulation can be used to achieve efficient individual animal disease risk management behaviour. A first precondition is that it is possible to control regulated issues. Control of individual animal disease risk management activities largely depends on the capacity of the Veterinary Service, and also on the nature of the activity considered. Early disclosure for example cannot be perfectly controlled, because it is not possible to observe permanent alertness of livestock holders regarding changes of their herd's health status. The capacity of Veterinary Services is probably the main obstacle to achieving efficient animal disease risk management of livestock holders through regulation in many developing and transition countries. Secondly, violation of regulated issues needs to be sanctioned. If non-compliance with regulation does not have negative consequences, regulation cannot be a successful instrument to achieve efficient individual risk management behaviour. Also this precondition may not be fulfilled in regulating risk management of livestock producers. Sanctioning poor backyard holders for example may not be easy to implement, particularly when violation of legal standards turns out to be very common.

A second instrument to reach efficient risk management activities of livestock holders is compensation, which is the focus of this section of the study. The compensation of costs and losses that livestock holders incur due to disease outbreaks and related control measures is an instrument to induce livestock holders to contribute to animal disease risk management, e.g. by declaring the disease and cooperating with culling teams. The compensation rules however have to be carefully designed in order to be incentive compatible. With reference to the reasoning above, which identified externalities as the cause of inefficient individual behaviour, the function of a compensation mechanism is to release some of the costs of risk management activities from the individual livestock holder. That makes individual risk management measures less costly and induces individual livestock holders to change their behaviour towards increasing risk management activities.

6.3.1.3. Set-up of a Country Compensation Mechanism

Setting up a Country Compensation Mechanism (CCM) is an eligibility criterion for countries that wish to receive financial support from GERFAE for compensation payments (see section 6.1.5). Regarding the question of what kind of organisational set-up a CCM should have to fulfil this compensation function, there is no globally valid best practice. Therefore we focus on pointing out the operating principles of a Country Compensation Mechanism, not its institutional framework.

A compensation mechanism has to work closely together with the national Veterinary Service, since emergency response measures of the Veterinary Service must be accompanied by compensation in order to be successful.[183] It could therefore even be considered that the CCM is part of a country's Veterinary Service. The state of the Veterinary Service, the existing structure and the diversity of a country's livestock sector determine the institutional arrangement of a Country Compensation Mechanism, which could be implemented with a Central Animal Health Fund, a Regional Animal Health Fund, Sector Agreements, etc. The formal integration of livestock holders, e.g. representatives of farmer's organisations, is likely to increase acceptance and performance of the Country Compensation Mechanism,[184] and is also considered best practice in existing cost-sharing schemes for epidemic livestock diseases. It is also best practice for establishing a Country Compensation Mechanism to draw on existing structures and involve stakeholder organisations as much as possible.[185]

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[183] World Bank (2006a), p25

The need for a close linkage between Country Compensation Mechanism and Veterinary Service arises from several factors. Firstly, emergency response planning of the Country Compensation Mechanism to cope with emerging compensation claims is directly related to the emergency planning of the Veterinary Service regarding culling. Secondly, the availability of data on livestock holders/establishments that provide at least approximate information about the number and species of animals in a country's regions is equally important for the Veterinary Service and the Country Compensation Mechanism, in both emergency planning and emergency response. Thirdly, actual control measures including culling are carried out under the authority of the Veterinary Services, and timely compensation requires a very close cooperation in operational terms. Finally, the availability of contingency funds/a relevant government budget line to (co-)finance emergency response measures is equally relevant for both Veterinary Services and Country Compensation Mechanism.

As compensation payments to livestock holders have led to significant problems in the past and badly designed programs can even lead to a spread of disease (see section 4 of Part III), a CCM has to operate on predefined rules that prevent the creation of adverse incentives. For this aim, however, a certain complexity of compensation rules is required (e.g. taking into account the development of market prices, see below). On the other hand simplicity and transparency are key for success of a compensation system in a developing country context, and are also prerequisites to create local ownership and involvement. The challenge will be to create compensation rules as simple as possible and define as many procedural aspects as feasible *before* a disease outbreak, while taking into account the practical realities of the country. An important role of GERFAE could be to contribute to an exchange of best practices in this respect.

This leads to the following recommendation for set up and operation of a Country Compensation Mechanism:

9. ***A Country Compensation Mechanism has to be to be adapted to a country's Veterinary Service infrastructure and livestock production structure.*** The institutional set-up of a Country Compensation Mechanism has to allow for close cooperation with the country's Veterinary Service because compensation is a key element of emergency response. In establishing a Country Compensation Mechanism, it should be drawn on existing social, political and industrial institutions in order to increase acceptance and reduce set-up costs. To avoid collusion, the use of independent financial auditors is recommended (see recommendation 25).

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[184] World Bank (2006a), p10, 11

[185] Civic Consulting (2006)

6.3.2. Providing incentives for early disclosure and compliance with veterinary restrictions

6.3.2.1. Livestock holders' costs and losses of animal disease outbreaks

Operational guidelines of a Country Compensation Mechanism should encourage livestock holders to notify disease outbreaks to the Veterinary Service in due time and to comply with veterinary control measures. Analysing the incentives of livestock holders for undertaking risk management measures first of all requires understanding the economic consequences they have to bear, because these consequences, i.e. the livestock holder's costs and losses, directly depend on the risk management activities early disclosure and compliance with restrictions, which are analysed in this section. The following table provides an overview of possible costs and losses farmers may incur in case of an animal disease outbreak.

Table 20: Livestock holders' costs and losses

	Type of costs/ losses	**Examples**
Direct impact	*Direct disease losses and control costs*	▪ Value of culled or dead animals ▪ Costs related to culling (e.g. disposal costs) ▪ Veterinary inputs ▪ Cleansing and disinfection etc.
	Other direct production losses of livestock holders directly caused by veterinary restrictions	▪ Business interruption losses directly caused by veterinary restrictions ▪ Partial loss of animal value (e.g. through vaccination, etc.) ▪ Other expenses directly related to established restriction zones in the country (extra feeding costs, etc.)
Indirect impact	*Losses caused by ripple effects (impacts on prices and on upstream and downstream activities)*	▪ Price effects on the sales markets ▪ Loss of access to, or the opportunity to access, regional and international markets ▪ Public's loss of confidence in animal industries in their countries, or of an importer country regarding the animal health situation in the exporter country

Note: This is a shortened version of a table included in Part I.

Livestock holders incur *direct disease losses and control costs* when they are located in a culling zone. The major portion of this cost and loss category usually is the lost value of culled animals. Depending on characteristics of the livestock producer and national practices,[186] culling may imply other costs like disposal, veterinary or disinfection costs for the livestock holder.

Livestock holders incur *direct production losses* when they are directly affected by veterinary restrictions. As emergency culling usually goes along with veterinary restrictions imposed for a certain period of time, farmers located in a culling zone additionally have to bear direct production losses, e.g. business interruption losses due to temporary restocking prohibitions. Unlike direct disease losses and control costs, farmers located outside of culling zones may also have to bear direct production losses. The reason is that disease eradication and containment can require establishing a restriction zone around the culling zone. Restrictions imposed on farmers in restriction zones may be breeding prohibitions, movement prohibitions of feed and/or animals, ring vaccination, etc.

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[186] Throughout this section we will assume that emergency culling and disposal of culled animals is provided by the Veterinary Service, so that a livestock holder's direct disease losses and control costs predominantly consist of the value of culled and dead animals.

Losses caused by ripple effects are not restricted to farmers directly affected by emergency response measures. As there is no direct link between losses caused by ripple effects and livestock holder's risk management activities, they will not be considered in the analysis of incentive compatibility of a Country Compensation Mechanism. Examples for losses caused by ripple effects are price effects or losses due to the closing of export markets.

6.3.2.2. Early disclosure incentives

From an individual livestock holder's perspective, there may be a feeling of being at the mercy of animal diseases. Although prevention may reduce the probability of an infection, not much can be done when there appears to be an infection in the herd. Particularly notifying the Veterinary Service may not be seen as a risk-reducing activity: The Veterinary Service in charge would probably order culling, which means that the livestock holder would loose animals which do not yet show disease symptoms and still could have been sold on the market. From a livestock holder's perspective, early disclosure can be perceived as increasing animal disease losses. The compensation of costs and losses caused by disease outbreaks and the following emergency response measures reduces the livestock holders' costs of notifying the Veterinary Service and thus potentially induces him to actually make the decision to notify the Veterinary Service. The very existence of a proper compensation scheme has therefore to be considered a major incentive for disease reporting and possibly even early disclosure. The condition is that a good, well-publicised and respected CCM can be introduced. This is a major challenge, as experience in the livestock sector and other sectors indicate that farmers in developing countries do often not trust government compensation. Therefore assistance to eligible governments may be required not only regarding the technical details of a CCM, but also regarding a communication strategy to inform livestock holders on the system and to build up trust in the system.

The right to get compensated may induce a livestock holder to notify the Veterinary Service about suspected disease outbreaks. However early disclosure is not a discrete, but a continuous form of behaviour, since it involves the livestock holder's enduring alertness regarding his herd's health status. It is not sufficient to make sure that a livestock holder notifies suspected disease outbreaks in order to achieve efficient early disclosure behaviour. Additional incentives are needed to make sure that livestock holders frequently check their animals' health status, so that disease symptoms will be observed in an early phase of the disease outbreak.

A simple mechanism to provide incentives for alertness, thus enabling the early observation of disease symptoms is to apply different compensation rates for healthy, visibly diseased and dead animals. The compensation rate for healthy animals should be cut by half for visibly diseased animals. Dead animals should generally not be compensated at all, although there may be exceptions under specific circumstances, when dead animals have market value (and thus there is the danger they will be sold) or with diseases with high mortality rates (such as Avian Influenza) when disease control teams cannot respond within 72 hours of disease reporting by the farm in question.[187] The differentiation between healthy, visibly diseased and dead animals does not make high demands on the culling team's veterinary skills. The rule also does not undermine the incentive compensation payments provide for disease notification, since reduced compensation rates for diseased and dead animals just reflect the reduced values of visibly diseased and dead animals on the market.

This leads to the following recommendation for the provision of incentives for early disclosure:

10. ***A Country Compensation Mechanism should compensate visibly diseased animals at half the rate of healthy animals. Dead animals should not be compensated at all,*** although there may be exceptions under specific circumstances. The compensation of culled animals as such provides incentives to notify suspected disease outbreaks to the Veterinary Service as it reduces a livestock holder's costs of disease notification, which could lead to culling of the herd. Additionally, taking into account the number of dead and visibly diseased animals provides incentives for livestock holders to regularly check the herd's health status as it imposes costs on delaying notification of suspected outbreaks.

6.3.2.3. Compliance with veterinary restrictions

Besides early disclosure, successful disease control and eradication requires imposing restrictions on livestock production in and around the location of a disease outbreak. From a livestock holder's perspective, it may be beneficial to violate these restrictions, although this behaviour could have a negative overall effect on animal disease risk. As far as compliance cannot be enforced through regulation, control and sanctioning, a Country Compensation Mechanism has to provide incentives to livestock holders to comply with veterinary restrictions. Addressing this issue first of all requires understanding in what situations and why it could be beneficial for livestock holders to violate veterinary restrictions. We distinguish between the following forms of non-compliance with veterinary restrictions:

- *Avoid culling:* Farmers located in a culling zone do not hand over their animals to culling teams;
- *Seek culling:* Farmers located outside of culling zones import animals into culling zones or intentionally attract the disease to expand the culling zone;
- *Violate restrictions:* Farmers located inside of restriction and/or culling zones do not respect movement restrictions, breeding or restocking prohibitions, etc.

The compensation guidelines developed here explicitly have to take into account the incentives they provide to livestock holders for compliance with veterinary restrictions.

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[187] For a detailed discussion of the issue of compensating sick and dead animals in the context of Avian Influenza see World Bank (2006a), p15. In any case, however, compensation for dead animals has to be lower than for healthy ones and visibly diseased ones.

6.3.2.4. Lower and upper limit of compensation rates for animals culled

The determination of compensation rates is a critical issue for the incentive compatibility of a Country Compensation Mechanism, as they affect the willingness to early disclose suspected disease outbreaks and to comply with veterinary restrictions. In World Bank (2006a) it is stated that compensation rates "(…) need to be high enough to encourage farmers to engage in early and complete reporting of the disease."[188] This statement describes incentives of farmers with disease cases in their herds to early disclose these outbreaks. It is concluded that compensation rates need to meet or exceed a minimum level in order to encourage early disclosure. Such a minimum rate would also provide incentives for compliance of livestock holders with culling orders and mitigate one form of non-compliance with veterinary restrictions, namely "avoid culling".

Experience with compensation in both developing and developed countries, on the other hand, also indicate the risks of overcompensation: "[Compensation rates] need to be low enough to avoid encouraging farmers from still disease-free areas to present their animals to be culled, or others to move potentially sick birds across zones in hopes of receiving compensation in excess of prevailing market prices."[189] This notion refers to the second form of non-compliance with veterinary restrictions defined above, i.e. "seek culling", which comprises the import of animals into culling zones or the expansion of culling zones through intentional infection.

Both activities represent an intentional spread of the disease. The quote above states that a maximum compensation rate should not be exceeded in order to ensure this form of compliance with veterinary restrictions. Unlike the determination of the minimum compensation rate it is possible to exactly define an upper limit, which could definitely eliminate non-compliance with veterinary restrictions in the form of intentional infection of livestock. This upper limit for compensation simply is the market value. No rational livestock holder would seek culling of his animals when compensation would not exceed the animals' market value.[190]

This leads to the following recommendation for determining a feasible spread between minimum and maximum compensation rates:

11. ***A Country Compensation Mechanism should apply compensation rates that are sufficient to induce early disclosure and compliance with culling orders, but do not create adverse incentives for livestock holders to seek culling.*** Compensation rates for culled animals need to exceed a certain level to induce farmers to notify suspected disease outbreaks and to hand over animals to culling teams when they are located in a culling zone. They may under no circumstances be higher than market values.

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[188] World Bank (2006a), p19

[189] Ibid

[190] It will be shown below that this conclusion does not hold when we include direct production losses, e.g. business interruption losses, in the analysis of incentives. However this problem cannot be solved through adjusting compensation rates, which is why we abstract from this issue for the time being.

6.3.2.5. Determining compensation rates for animals culled

The analysis of incentives shows that compensation rates generally have to be based on livestock holders' losses due to culling, i.e. on the market values of the culled animals. That implies defining compensation rates according to animal types. An animal type is defined by animal characteristics that determine the animal's market value, e.g. species, usage, sales market, age, breed, etc.[191] Every Country Compensation Mechanism should develop a scheme of animal types which basically has to fulfil two requirements: First of all the different animal types in the scheme should appropriately reflect value differences of livestock characterised by species, usage, sales market, age, breed, etc. produced in the country. The definition of animal types in the scheme secondly has to allow for an unquestionable classification of livestock produced in the country into animal types to create trust among livestock holders regarding compensation for their animals and to avoid problems in assigning animal types to livestock culled during emergency situations. These efforts result in establishing a list of animal types distinguished for the purpose of compensation through a Country Compensation Mechanism.

Next a value has to be assigned to every animal type on this list, which we will refer to as the *type-specific animal value*. Type-specific animal values have to be based on actual market prices, but a strict orientation on market prices bears problems and may not be possible anytime. First of all, the volatility of market prices is seen as a problem to create trust among livestock holders, as it would cause uncertainty regarding animal compensation values and thus undermine the incentives for early disclosure and compliance with culling orders. This valid objection suggests calculating type-specific animal values as a smoothed average of past and actual market prices and holding it constant for a certain period of time. If the compensation value is set on basis of a mix of historical and present market values, then it implies the need for good market price tracking, and a pre-determined formula, to avoid time-consuming negotiations in an emergency situation. Simplification, objectivity and transparency of compensation is a key for developing country operations, therefore as many of the related decisions should betaken prior to an emergency period (i.e. establishing price tracking mechanisms and related formulas ex-ante).

The rules determining type-specific animal values however have to allow for adjustment in order to avoid the above mentioned adverse incentives, i.e. "seek culling" in case of significant price drops,[192] and to remain incentives for early disclosure and compliance with culling order in case of price increases. Such an adjustment of type-specific animal values would have to take place when the deviation from the actual market value for that animal type exceeds a tolerable range.

Market prices for certain animals may not be determinable due to low trade volumes. In this case, we suggest defining the type-specific animal values as a share or multiple of the values of the type of the same species with the highest representation on the local market. This share or multiple value should be estimated based on prices of historical transactions of the animal type in consideration and should also be established well before an outbreak occurs.[193]

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[191] See section 3.2 in Riviere-Cinnamond (2005)

[192] World Bank (2006a), p21

[193] A similar system could be used when market prices are non-existent because the local market breaks down. Then the reference could be the nearest market which is still in operation, i.e. the neighbour market.

Particularly large farms may serve different output markets at different prices.[194] This is unproblematic as long as livestock holders serve domestic markets only, since price differences on domestic markets mainly reflect transportation costs from the farmer's point of view, and significant differences in market prices between regions have to be considered when setting compensation rates.[195] Problems however occur when livestock holders produce for export markets and export market prices systematically exceed domestic market prices. Compensation rates would need to reflect these value differences in order to be incentive compatible, which implies that type-specific export animal values would have to be determined. Compensation would then have to be based on recent sales records of the export-oriented farm to determine the share of production produced for export.[196] The degree to which it is in practice feasible to differentiate between high numbers of different type-specific animal values depends on the national circumstances. The more animal types are defined and the better current market prices are monitored, the more is safeguarded that adverse incentives for livestock holders are prevented. In practice, a Country Compensation Mechanism will in most developing and transition countries have to work with a limited number of type-specific animal values, as "simplicity is a key requirement for a compensation system".[197]

This leads to the following recommendation for the definition of animal values, which should be used as a basis for determining compensation rates for animals culled:

12. ***A Country Compensation Mechanism has to develop an unambiguous scheme of animal types representing the different values of animals produced in the country.*** For this aim type-specific animal values have to be determined, which are a smoothed transformation of past and actual local market values. The values have to be adjusted during longer outbreak situations to prevent adverse incentives resulting from large deviations between compensated values and actual market prices. Incentive compatible compensation of export-oriented farms requires developing and recording type-specific export values in case of price differences between similar animal types produced for domestic and export markets.

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[194] World Bank (2006a), p8

[195] Market prices for specific animal types may differ significantly between different regional markets, especially in the case of large countries. The correct equivalent for a livestock holder's losses when his animals get culled is the market price on the nearest local market, i.e. the local market. Therefore, in case that no country-wide market value for a given animal type can be set, the Country Compensation Mechanism should base type-specific animal values on regional market prices and would have to develop and maintain records of *regional type-specific animal values* for determining compensation rates.

[196] This approach, however, would only be necessary for compensating animal losses when culling indeed affects export possibilities of export-oriented farms. Once export markets are closed due to import restrictions of other countries, compensation to export-oriented farms should be based on locally or regionally determined type-specific animal values only in order to avoid "seek culling" behaviour. Type-specific export animal values reflect supply and demand on the export markets. If only some, but not all importing countries impose import restriction, the type-specific export animal values would ideally reflect this reduction of demand, and the type-specific export animal value would approach to the corresponding domestic type-specific animal value.

[197] World Bank (2006a). Refer to pages 20-23 for a detailed discussion of market prices and price baselines.

6.3.2.6. Compensation of different livestock production sectors

In the last section general recommendations for the compensation of livestock holders have been developed in order to achieve individual risk management. The incentives for early disclosure and compliance with veterinary restrictions are generally shared among different livestock holders. In order to develop clear compensation guidelines, however, a differentiation of categories of livestock holders has to take place.

As has been mentioned before, registration is an important precondition for effective and efficient animal disease risk management, including a functioning compensation system. As it requires cooperation of livestock holders, it can be perceived as an individual risk management activity. However, in most countries a complete registration of livestock holders cannot be reached. Especially in countries with many backyard holders, registration would involve prohibitively high administrative efforts. On the other hand, registration of livestock holders/establishments is important for planning and implementing emergency response. It therefore has to be an aim of a Country Compensation Mechanism to achieve and improve livestock registration. It is therefore recommended to differentiate between individually registered and individually unregistered livestock producers. An obvious criterion based on reasonable assumptions regarding the costs and benefits of registration is farm size.[198] Hence it should be aimed at achieving registration of farms above a certain size with the Veterinary Service. To actually achieve registration of large farms, an incentive- and a regulation-based approach is recommended here.

The incentive-based approach is to determine a maximum number of livestock compensated per unregistered livestock holder in case of an outbreak, i.e. a compensation limit.[199] This would provide a clear incentive for registration to farmers. Experiences in other sectors indicate that this type of incentives work in practice. For example, in a smallholder banana crop insurance program in the Caribbean, where premiums were deducted at source from banana payments to farmers, once it was known that farmers not registering their holdings would not be compensated in the event of a claim, almost all farmers were keen to register, and the database became the most detailed informational source on banana holdings in the islands.[200] For livestock, eligibility to compensation being dependent on registration of herds could be a significant incentive to register. This could be particularly important where there are existing disincentives to register herds - e.g. potential taxation or other issues. In case of an outbreak and culling, unregistered farms exceeding this maximum number of animals would not be compensated for those animals above the maximum number. Registration would therefore be a dominant strategy of large farms over non-registration. However this is only true if the compensation limit is a credible commitment of the Country

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[198] Costs mainly increase with the number of registrations, while benefits increase with the share of livestock registered. That means an efficient level of registration predominantly requires large farms to register.

[199] The maximum number of animals to be compensated would have to be defined per species. The aim of this principle is to gain control of registered farms, so that registered livestock producers are available for information transmission, for improving emergency preparedness and emergency response, and for controlling compliance with legal standards. The maximum number of animals to be compensated would need to be adjusted to the capacity of the Veterinary Service, so that the Veterinary Service can fulfil its role in animal disease risk management in an environment of a properly registered livestock industry. The Veterinary Service ultimately has to be capable of accomplishing additional control and information functions that come along with the opportunities for risk management which are provided by an increasing level of registration.

[200] This example refers to the example of, the Windward Island Crop Insurance Ltd (WINCROP), which provides banana windstorm coverage in 4 Caribbean islands. Source: Communication with authors.

Compensation Mechanism (and government). This assumption could however be questionable. A livestock holder with a large herd may assume that compensation will be provided anyway when culling occurs. That is why the credible commitment of the Country Compensation Mechanism could be complemented by legislative measures. It could be prohibited for unregistered livestock producers to hold more than a maximum number of animals. The Veterinary Service would have to enforce compliance with this legal standard, i.e. force registration or disposal of animals in unregistered farms exceeding the maximum number of animals.

This guideline would after a transition period split a country's livestock production industry into two sectors: Registered *commercial livestock producers* characterised by exceeding a certain farm size, and unregistered, *small-scale and backyard livestock holders*. The maximum number of animals is a threshold in terms of a Country Compensation Mechanism. Livestock producers exceeding this farm size will be treated as commercial livestock producers. This implies rights and duties of commercial livestock producers and the application of compensation guidelines developed for commercial livestock producers (see section 6.3.3 below). On the other hand, there are small-scale and backyard livestock producers, characterised by farm sizes falling short of the maximum number of animals to be compensated for unregistered livestock holders. The guidelines for the compensation of costs and losses of animal disease outbreaks for small-scale and backyard producers developed in section 6.3.4 (below) describe the operational principles of a Country Compensation Mechanism for the compensation of this sector.

It has to be noted that the registered commercial sector and the unregistered small-scale and backyard sector will not be equally relevant in all developing and transition countries. Registration makes only sense if it implies a certain level of official veterinary control.[201] Therefore countries with stronger Veterinary Services may set lower thresholds for the numbers of animals that can be kept without registration, i.e. increase the share of the livestock population under veterinary control. In general, the relevance of individually registered and unregistered livestock sectors would depend on the capacity of the Veterinary Service and the state of evolution of the livestock industry in the country.[202]

This leads to the following recommendation aiming at achieving an efficient level of registration of livestock producers:

13. ***A Country Compensation Mechanism should define a maximum number of animals for each specie that are compensated in case of culling, if the livestock holder is not individually registered.*** This maximum number of animals is the borderline between individually registered commercial livestock producers and small-scale and backyard livestock holders, who are not individually registered. The maximum number of animals to be compensated without registration should reflect the capacity of the Veterinary Service of the country. An appropriate borderline should be chosen so that the Veterinary Service can administer registration and fulfil its control function regarding commercial livestock producers. Unregistered livestock holders should not be compensated for culled animals above the maximum number.

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[201] Official veterinary control means that the Veterinary Authority knows the location of the animals and the identity of their owner or responsible keeper and is able to apply appropriate animal health measures, as required (OIE Terrestrial Code).

[202] See Figure 2.1 in World Bank (2006a), page 10, regarding the state of evolution of the national poultry industry in various countries. If countries are very divers regarding their Veterinary Service capacity and livestock production structure, it could be considered to apply regionally differentiated maximum numbers of animals to be compensated in unregistered farms.

6.3.3. Compensation of commercial livestock producers

6.3.3.1. Compensation of animals culled

As has been pointed out before, a lower compensation rate for visibly diseased animals and dead animals provides adequate incentives for early disclosure of suspected animal disease outbreaks and for cooperation of livestock holders in the case of emergency culling. The question is whether the compensation rate for healthy animals should be equal to the type-specific animal value, or lower. Evidence from countries with Avian Influenza outbreaks has shown that a compensation rate of 50% of the animal value can be enough, if veterinary restrictions are accompanied by strong control efforts in order to prevent a violation of restrictions. A compensation rate of over 100% is generally not recommended because of the creation of adverse incentives. Based on these international experiences we suggest the following system: As we base compensation rates on type-specific animal values, which may deviate from actual market prices, *we suggest a compensation rate of at least 60% for healthy animals to prevent falling below the minimum of 50% of actual market values. For the same reason, we recommend to compensate healthy animals at a maximum rate of 90%.*

The goal of a Country Compensation Mechanism supported by GERFAE is to induce effective and efficient animal disease risk management of livestock holders. As commercial livestock producers differ in their risk management standards, it would not make sense to treat them equally. From an incentive point of view, livestock holders meeting higher (pre-defined) bio-security standards need to be treated better than others meeting lower standards, in order to provide incentives for the evolution of the livestock industry towards higher bio-security standards among commercial livestock holders. We therefore suggest providing *higher compensation rates to commercial livestock producers meeting higher pre-defined bio-security standards*. Compensation rates however have to stay within the above defined range of 60% to 90% of type-specific animal values to provide incentives for early disclosure and cooperation with culling orders without creating adverse incentives.

For that purpose we classify commercial livestock producers into three different bio-security levels, which will be referred to as low, moderate and high. As simplicity is key, the pre-defined criteria that determine a commercial farm's bio-security level need to be easily observable and verifiable, e.g. indoor keeping, fencing, all-in-all-out production documented in records, documented regular veterinary checks etc. Depending on the circumstances of the country the CCM would have to concentrate on bio-security measures for developing the classification that make a difference for the farm's risk of attracting and/or spreading animal diseases. The three bio-security levels could be reflected by compensation rates of 60% of the type-specific animal values for low bio-security farms, 75% for moderate bio-security farms and 90% for high bio-security farms for healthy animals. Visibly diseased animals should be compensated at half of this rate. It is important to have clear administrative procedures in place regarding the assessment of the bio-security level and related compensation level, as this has a financial implication for the farmer. If the assessment has to be done by the same persons (e.g. culling teams, veterinarians) who need to have the full co-operation of the farmers in the culling operation, this could lead to tensions. Distancing financial compensation decisions from the normal functions of Veterinary Services would be operationally desirable, if it is feasible, and has to be carefully planned by the CCM. As the differentiation of the compensation level depending on bio-security measures is intended as incentive for increasing bio-security of livestock holders, such a system has to be properly communicated to the farmers in advance.

This leads to the following recommendation for the compensation of commercial livestock producers' costs and losses of animal disease outbreaks:

14. ***Animal losses of commercial livestock producers due to culling should be compensated according to the bio-security level of the farm.*** Low, moderate and high bio-security farms should be compensated at rates of 60%, 75% and 90 % of the type-specific animal value for healthy animals and half of these rates for visibly diseased animals. Criteria for bio-security have to be pre-defined and communicated to farmers to provide incentives for taking the relevant measures.

6.3.3.2. Compensation of business interruption or other direct production losses

The compensation of animal losses can have a significant effect on the willingness of livestock holders to early disclose disease outbreaks, to comply with culling orders and to avoid intentional infection or movement of animals into culling zones ("seek culling behaviour"). Compensation rates have to exceed a minimum level to provide incentives for the former goals, but must not exceed a maximum level to achieve the latter goal. However, we have focused so far on animal losses. Once an animal disease outbreak is confirmed, the Veterinary Service imposes various kinds of restrictions on livestock holders in and around the origin of the outbreak. These restrictions cause various kinds of direct production losses, e.g. business interruption losses or extra feeding costs, as has been shown in Table 20.

These losses caused by veterinary restrictions have an influence on early disclosure decisions, because livestock holders know that notification may trigger various kinds of restrictions, which would affect them for an unknown period of time. This aspect is particularly important for export-oriented commercial farmers, who may permanently loose international sales markets after notification of disease outbreaks. Business interruption losses and other losses such as extra feeding costs also provide an incentive to attract the disease, i.e. "seek culling", to livestock holders, which are directly affected by veterinary (movement) restrictions but are not located in a culling zone. The reason is that during a longer disease situation business interruption losses and related losses of these livestock holders increase. If no end to the veterinary restrictions is in sight, potential losses of these farmers can only be reduced when the disease spreads and requires carrying out culling (and compensation) on their farms, too. A farmer with an infected herd could be better off than a farmer with a healthy herd located in a restriction zone. It is straightforward to see that farmers would have adverse incentives to "seek culling", since they would not have to bear no longer extra feeding costs, etc.

Other adverse incentives created by veterinary restrictions outside culling zones are incentives to violate business restrictions[203] in order to reduce direct production losses, e.g. to restock production facilities although a temporary business restriction has been imposed, or to violate movement restrictions. Especially when livestock is not infected, restrictions seem to be incomprehensible from the livestock holder's point of view.

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[203] "Violation of business restrictions" is the third form of non-compliance with veterinary restrictions that has not been addressed yet. It may be difficult to distinguish from "seek culling" and "avoid culling", but such a general category is needed to capture the various sorts of veterinary restrictions and the incentives of livestock holders to violate these restrictions.

Not all of these costs and losses accrue to every livestock holder. But it is the case that all livestock holders affected by veterinary restrictions bear costs and/or losses besides the loss of animals that may have been culled under an emergency response program. The adverse incentives described here obviously cannot be solved through adjusting compensation rates for animals culled.[204] It would, however, be possible to provide compensation to livestock holders for the costs and losses directly caused by veterinary restrictions. This is referred to as the incentive-based approach. If direct production losses like business interruption or other direct losses are compensated, livestock holders would not have the above mentioned adverse incentives. A compensation of direct production losses would also provide incentives for early disclosure in addition to compensation for animals culled.[205] Compensation for direct production losses would however have to be conditioned upon the compliance with restrictions. It is important to underline that direct production losses only refers to losses such as business interruption losses that are exclusively borne by farmers directly under veterinary restriction. Other losses caused by ripple effects such as a drop in prices of livestock caused by a disease outbreak are borne by all farmers in a country or region similarly and do not have to be compensated to prevent adverse incentives.

Compensation of direct costs and losses of farmers other than the animal value is uncommon in most of the compensation systems in the world, for various reasons including the need to quantify e.g. business interruption losses. The exact amount of costs and losses caused by veterinary restrictions such as business interruption losses is hard to determine, but they certainly depend on the time period the restrictions are in force and on the farm size. That is why daily flat rates for compensating business interruption losses directly caused by veterinary restrictions are used in some existing schemes, e.g. for FMD in France.[206] In many cases, budgetary restraints will be a major reason to not even consider the possibility of compensating business interruption losses and other direct production losses of livestock holders under veterinary restrictions. However, a compensation system that only compensates the value of culled animals and therefore provides adverse incentives may cause more serious disease outbreaks and could even be more expensive than an incentive compatible system that provides more comprehensive compensation.

Instead of compensation of business interruption losses through the Country Compensation Mechanism it would be also possible to develop private insurance solutions for these losses to complement governmental compensation of the animal value. In many cases insurers consider the existence of a functioning public veterinary infrastructure and governmental compensation of the animal value a prerequisite to enter the epidemic disease insurance market. Developing complementary insurance of business interruption losses could therefore be envisaged in parallel to upgrading the veterinary system and to establishing the Country Compensation Mechanism. However, as the research for Part III indicates, this is rather a long-term perspective and in most developing and transition countries private insurance of epidemic disease losses is currently not an option.[207]

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[204] Promoting early disclosure and avoiding "seek culling" of livestock holders located within restriction but outside of culling zones would require adjusting compensation rates in the opposite direction. "Violating business restrictions" cannot be addressed at all through compensation rates for animals culled.

[205] The necessity for including direct production losses into compensation schemes has been recognised in the EU context. Civic Consulting (2006), p80-81

[206] Cassagne (2002)

[207] Please refer to sections 4 and 5 of Part III. It has also to be noted that to make a difference regarding incentives for risk management, any private insurance solution would need to be compulsory, which is an additional hurdle.

It has to be clearly understood that any system that only compensates the value of animals culled and at the same time imposes movement or other business restrictions for veterinary purposes on livestock holders, necessarily creates adverse incentives. In these cases compliance with veterinary restrictions has to be enforced by policing livestock holders. This approach can be expected to require a massive extension of control compared to an incentive-based approach, i.e. may need the deployment of police and/or military forces to support the emergency response of Veterinary Services.[208] There is some evidence that suggests that a policing approach can successfully complement limited compensation in emergency response.[209]

If a policing-approach is chosen, veterinary restrictions can possibly be enforced if a government is capable of mobilising enough forces to enforce movement restrictions. However, a policing-approach during disease outbreak situations does obviously not provide any incentives for early disclosure before the first outbreak is detected. In case compensation rates for animals culled do not provide sufficient incentives for early disclosure, this may lead to efforts of livestock holders to conceal the outbreak. The highest adverse incentive to conceal an outbreak would have farms that would face the highest production losses in case veterinary restrictions are imposed. These would be large farms and particularly export-oriented farms, which have much to loose when the official Veterinary Service notifies the outbreak to the OIE and import restrictions on their products are imposed in major markets. Although in many cases export oriented farms are said to apply higher bio-security standards than other production sectors, this indicates the need for enhanced disease surveillance in export-oriented farms under a policing approach, since they would have strong incentives to conceal suspected disease outbreaks when business interruption losses and other direct production losses are not compensated.

The following recommendations aims at achieving compliance of livestock holders with veterinary restrictions and reinforcing incentives for early disclosure:

15. ***Compliance of commercial livestock holders with veterinary restrictions can either be achieved through an incentive-based approach by also compensating business interruption and other losses caused by veterinary restrictions, or through policing of livestock holders in disease outbreak situations.*** During long outbreak situations, livestock holders under movement restrictions could be worse off than livestock holders with infected herds if only animal losses due to culling are compensated. In these cases, adverse incentives are created and compliance with veterinary restrictions has to be massively controlled through deployment of police or military forces.

16. ***If an incentive-based approach is chosen to achieve compliance with veterinary restrictions and to provide additional incentives for early disclosure, a Country Compensation Mechanism has to determine daily flat rates to compensate business interruption and other losses of livestock holders directly caused by veterinary restrictions.*** The flat rates should reflect costs and losses as precise as reasonably possible, which means they would have to depend on farm size, on the sort of restrictions in force, and on the situation of the farm affected by the veterinary restrictions.

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[208] The control-based approach also implies movements of people around restrictions zones, which may not be considered as helpful for disease containment.

[209] World Bank (2006a), p24

6.3.3.3. Summary of compensation of commercial livestock holders

The following table summarises the recommendations for the compensation of commercial livestock producers and emphasizes how incentives for different individual risk management activities are provided:

Table 21: Overview of compensation principles for registered livestock producers

	Low bio-security	Moderate bio-security	High bio-security
Characteristics	Bio-security level I (Low bio-security)	Bio-security level II (Moderate bio-security)	Bio-security level III (High bio-security)
Incentives for registration	Correct registration with the Veterinary Service will be monitored and is a pre-condition for compensation payments		
Compensation rate healthy animals	60% of type-specific animal values	75% of type-specific animal values	90% of type-specific animal values
Compensation rate diseased animals	Half of the rate for health animals is compensated for visibly diseased animals, no compensation for dead animals		
Compensation ceiling	No maximum number of animals to be compensated		
Incentives for early disclosure	Half of the rate for healthy animals is compensated for visibly diseased animals, no compensation for dead animals		
Additional incentives for early disclosure and compliance with veterinary restriction	Option 1: Incentive-based approach, i.e. compensation of other direct production losses of livestock holders directly caused by veterinary restrictions (e.g. business interruption costs, extra feeding costs, partial losses in animal value) Option 2: Policing approach to monitor early disclosure an compliance with veterinary restrictions		
Incentives for bio-security	Higher compensation rates for higher bio-security levels. Compliance with level-specific bio-security requirements will be controlled		

6.3.3.4. Contract Farming

A comprehensible approach is needed for the treatment of contract farming, i.e. when the owner and the farm manager are different persons, which is sometimes the case in commercial livestock production. The compensation system developed here is based on incentive compatibility, which means that the conditions determining the amount of compensation are designed to induce risk-reducing behaviour of livestock holders, i.e. registration, early disclosure, compliance with emergency restrictions and prevention. From an economic point of view, legal ownership of farm or herd is not a relevant criterion. It is decisive that the beneficiary of compensation payments is the person that makes decisions regarding registration, early disclosure, selling animals, buying animal products, restocking, prevention, etc. Hence, a Country Compensation Mechanism should disburse compensation payments, whenever legally possible, to the person responsible for farm management decisions. Sharing rules between owner and manager should not be developed on the level of the Country Compensation Mechanism, since these could never reflect the complexity of existing manager-owner relations regarding labour and capital input and willingness to accept risk. How payments are shared between manager and owner should be negotiated between them.[210]

6.3.3.5. Contributions of commercial livestock holders to the Country Compensation Mechanism

There is an increasing recognition in many developed countries that it is desirable to share responsibility and costs of epidemic disease outbreaks with the affected livestock sector.[211] In nearly all countries that have implemented a cost-sharing system, this is focusing on the commercial sector, as transaction costs rarely justify collecting contributions from backyard holders.[212] In most countries, collecting contributions from backyard holders is also not possible for practical and social reasons. Should GERFAE require from Country Compensation Mechanisms in eligible countries to collect contributions from the commercial sector? In the short term this does not seem to be a feasible approach, as most developing and transition countries would already struggle to register commercial livestock producers required for implementing a Country Compensation Mechanism. However, as soon as feasible the GERFAE Governing Board should consider to require CCMs from eligible countries to share costs with livestock producers.

The following sections explore possible cost-sharing rules, that could be implemented once the GERFAE Governing Board decides to introduce this requirement, possibly with a transition period during which commercial farmers' contributions to the CCM would gradually be required to increase. In the following, several possible criteria determining the individual contribution of livestock holders will be introduced and assessed.

Farm size

An appropriate criterion for determining contributions of commercial livestock holders to a Country Compensation Mechanism could be farm size, which would have to be determined according to the numbers and/or types of animals. Different approaches are possible to determine farm size. A pragmatic approach would be to determine farm size categories. The more size categories are defined, the more precise contributions could be levied. As a more precise approach a specific levy could be imposed on the farmer for each animal of a specific category, as is the case in many established cost-sharing systems. Contributions based on farm size do not have any adverse effects on the incentives provided by the compensation rules developed in the previous sections. Furthermore, they are socially acceptable, since farm size is a factor, which reflects the ability to pay contributions. Therefore farm size is a reasonable criterion for determining commercial livestock producers' contributions to a Country Compensation Mechanism.[213]

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[210] In World Bank (2006a) it is suggested to split compensation between manager and owner to protect the manager, see p9

[211] See Civic Consulting (2006)

[212] An exception to this rule is the German compensation system, which also requires backyard holders of livestock to contribute.

[213] Calculating the contributions needed to finance a CCM, has many overlaps with needs which commercial insurers would have to develop premium rates for livestock insurance products. Please refer to the comments made in section 4 of Part III.

Adding a regional risk factor

Each of the above mentioned methods for determining contributions could be used in combination with a regional risk factor. This would create opportunities to provide additional incentives for animal disease risk reducing measures which have not been addressed in the analysis on compensation principles: Location and relocation decisions. Animal disease risk is regionally different, e.g. because diseases are endemic in some regions but not in others, because livestock density and therefore the risk of infection differs regionally, etc. In order to provide incentives for locating and/or relocating in regions with lower animal disease risk, a regional risk factor could be established which increases or decreases contributions according to relative animal disease risk in the region.

It can however be perceived as socially problematic to charge additional contributions according to regional risk, because relocation decisions involve large investment and transaction costs. We therefore recommend adding a regional risk factor[214] to govern the structure of a country's livestock industry only when risk accumulation in problematic regions is seen as a main obstacle towards effective and efficient animal disease risk management in a country.

These considerations lead to the following recommendation for the determination of contributions from commercial livestock producers to a Country Compensation Mechanism:

17. ***As soon as this is feasible, the GERFAE Governing Board should require Country Compensation Mechanisms from eligible countries to share costs and responsibilities with commercial livestock producers.*** Contributions of livestock holders to the CCM according to farm size are socially acceptable and would not have negative effects on animal disease risk management of livestock producers. If regional risk accumulation is a serious issue for effectively and efficiently managing animal disease risk in a country, a Country Compensation Mechanism should apply regional risk factors that increase or decrease contributions to influence location and relocation decisions. Because of the related advantages, GERFAE should encourage cost-sharing even before it becomes a formal eligibility criteria.

6.3.4. Compensation of small-scale and backyard holders of livestock

Compensation guidelines developed in the following section apply to what we refer to as the *small-scale and backyard livestock holders*, i.e. the unregistered sector in the context of a Country Compensation Mechanism. As mentioned above, a complete registration of all livestock holders in developing and transition countries would neither be a feasible, nor an efficient measure to enhance animal disease risk management. However, registration of livestock producers creates various opportunities for improving animal disease risk management, e.g. control, information transmission and implementation of bio-security standards. It would be misleading to conclude that inducing structural changes in the livestock industries of these countries towards commercial farming necessarily decreases global animal disease risk. Traditional livestock production in developing countries is an important reservoir of genetic variability.

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[214] The concept of regional risk adjustment and other elements of reaching risk-adjusted contributions to a cost-sharing scheme are discussed in depth in Civic Consulting (2006), p76-80

Furthermore it is a key factor of food security and employment for the poor population in developing and transition countries, and any government initiative to prohibit backyard holding of animals can lead to livestock owners going underground and escaping veterinary control measures.[215]

This section therefore firstly presents an approach that is new, but partly based on experiences with community-based compensation in countries such as Vietnam (see section 3.2.3). It aims at increasing animal disease risk management standards in the traditional livestock production through social accountability by introducing compensation through "production communities". As a second step, general rules for compensating backyard holders are elaborated. A Country Compensation Mechanism would have to provide for compensation of both backyard holders inside of production communities and of backyard holders where such communities do not exist, as a community approach has to be developed on the basis of existing social structures and is not always feasible (see section 6.3.4.3 below).

Independent from whether backyard holders of livestock are organised to some extent or not, it is important to recall the main criteria that separates this sector from the commercial livestock sector. In recommendation 13 (above) it was stated that a threshold has to be defined for the maximum number of livestock that is to be compensated in case the holder is not individually registered. This implies that *backyard holders of livestock are only compensated for animals that are below this threshold number, determined by the Country Compensation Mechanism.*

6.3.4.1. A social accountability approach: Compensation through production communities

Although it is unrealistic to achieve individual registration of small-scale and backyard livestock holders with the Veterinary Service in developing and transition countries, it is crucial for successful planning and carrying out of an emergency response to have some data available regarding livestock densities in different parts of the country. One way to obtain this is a regular census of livestock. Another way is to promote aggregate registration of livestock kept in one village or region, for example. The idea of the approach developed here is to formally treat these small-scale and backyard livestock holders as one entity in terms of the Country Compensation Mechanism. This entity will be referred to as a production community.

Some issues would have to be considered when a production community is defined. First of all, a representative of every production community, who functions as a link between the Veterinary Service and the Country Compensation Mechanism on the one side and the production community's livestock holders on the other side, is needed. The *production community representative* basically enables the interaction between Veterinary Service and the livestock holders needed to ensure effective and efficient animal disease risk management, e.g. transmission of knowledge and data. The production community representative would explain to livestock holders in the production community the compensation rules of the Country Compensation Mechanism, so that the incentive-based rules can result in the desired individual risk management behaviour.

Secondly, the geographical outline of a production community, which we will refer to as the *production community territory*, has to be geared to the structural circumstances relevant for animal disease risk management in the countries. Treating production communities as one entity in a framework for animal disease risk management makes sense if it actually is one element in terms of animal disease risk. That is definitely the case for small-scale and backyard flocks or herds kept in rural villages in many developing and transition countries, as these animals cannot be separated. From a risk management perspective, the flocks of 100 backyard holders kept in open sheds in a village are one risk factor, not 100 different ones. This also implies that if a production community is established, all livestock holders within the geographical scope of the production community have to be members of this production community to become eligible for compensation payments. When a production community is established, it should draw on existing social structures such as local government units or cooperatives. This would help keeping transaction costs of the formation of production communities low and also improve existing administrational structures or social networks.[216]

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[215] World Bank (2006a), p5

The production community representative would be responsible to provide data on the livestock held to the Veterinary Service. The quality of data from a production community might not be as high as from an individually registered livestock holder, but the Veterinary Service would at least have approximate data available for emergency planning and would have a contact point to promote awareness in the community. With the production community representative, members of a production community would have a contact person available for notifying disease suspicions or other problems regarding animal health risk. The organisation of production communities would therefore be a step in the establishment of animal health infrastructure in regions where such infrastructure is very limited. It could also be easily integrated into or built upon any existing network of para-veterinarians/local animal health workers or other relevant initiatives, if already existing.

This leads to the following recommendation for promoting the formation of production communities of small-scale and backyard livestock holders:

18. ***Small-scale and backyard livestock holders should be encouraged to form production communities to increase collective responsibility and communal accountability for animal health.*** The geographical outline of a production community has to reflect structural aspects of animal disease risk management. All small-scale and backyard livestock holders within this territory have to be members of the production community, which is to be encouraged through the design of compensation rules. The set-up of a production community should draw on existing administrational structures and social networks.

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[216] An example of community based targeting is the Productive Safety Net Program in Ethiopia, which started in 2005 and has been designed to provide households with enough income (cash/food) to meet their food gap, and thereby protect their household assets from depletion, and to build community assets to contribute to addressing root causes of food insecurity. The program components are public works (identified by the community) and direct support. The program is targeted geographically – food insecure areas have been defined to the Peasant Association (PA) level – and community/administrative targeting, based on pre-defined eligibility criteria, where a community committee is set up by the PA to select beneficiaries and a general assembly reviews the list, amends and endorses it. A review mechanism is also in place to consider other beneficiaries for exceptional conditions and appeal committees exist at PA and at district level to handle targeting complaints. Community targeting was possible as strong community structures exist in rural areas of Ethiopia. NB: A PA is the lowest administrative level in Ethiopia. Each PA comprises approximately 1,000 households. For more information refer to the World Bank presentation "The Productive Safety Net Programme in Ethiopia", http://info.worldbank.org/etools/docs/library/207058/The%20Productive%20Safety%20Net%20Programme%20in%20Ethiopia.pdf

6.3.4.2. Incentive compatibility in the community-based compensation approach

As has been pointed out, the organisation of small-scale and backyard livestock holders as a production community could improve the performance of public risk management because it enables registration of these livestock holders in an aggregated form and increases the outreach of the Veterinary Services. A production community creates opportunities to transmit information to backyard holders of livestock; it could therefore enhance individual capabilities of risk management. The main advantage of the production community however is that it renders small-scale and backyard livestock holders, which must be considered as uncontrollable livestock producers, accountable.

This can be achieved through a community-based compensation approach. In case of an outbreak, compensation payments would have to be determined according to the animals culled in the production community. The rules for a reduction of compensation payments would also be community-based, i.e. *high numbers of visibly diseased and dead animals would reduce compensation payments to the community as a whole. The individual livestock holder however receives a fixed share of total community compensation, which represents his share in the number of animals culled as specified in the culling records.*[217] The individual livestock holder's share would not depend on the disease status of his animals at the time of culling. Therefore the individual backyard holder has a significant incentive to provide diseased and dead animals to the culling team for disposal, thereby reducing dramatically the risk for illegal sale of these animals on local markets. Every diseased or dead animal provided to the culling team would increase the share of the livestock holder in the total amount received by the production community. On the other hand, the total compensation that the production community receives will be determined according to the compensation rules described above, i.e. reduced depending on the number of diseased and dead animals in the community as a whole. This means that any diseased or dead animal reduces the amount paid per animal to all members of the production community.

This community-based compensation approach would have several advantages. Early disclosure would be in the collective interest. Each and every livestock holder in the production community would have an incentive to notify a suspected disease outbreak in case an animal with disease symptoms in the production community is seen, regardless whether it is the own animal, the neighbour's animal or any other animal on the community's territory. The reason is that in case of culling, the individual compensation payment depends on the disease prevalence in the production community territory, i.e. would be reduced when the neighbour's animals are visibly diseased or dead. This alignment of social and individual interest would greatly improve early disclosure behaviour.

As disease prevalence in a production community becomes a social issue, this promotes a collective sense of responsibility for animal health and better creates disease awareness than any educational program imposed on livestock holders. Bio-security activities of every production community member would become a communal issue, and this would guarantee that simple bio-security measures would be carried out.[218] Bio-security measures requiring investment would likely not be undertaken by individual livestock holders, e.g. to allow for a certain degree of fencing of feedlots. On the level of a production community however, it could be better afforded to undertake such investments. The organisation of small-scale and backyard livestock holders in production communities could therefore potentially be an instrument to promote the cooperation of livestock holders in prevention and bio-security issues.

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[217] The culling certificate for the livestock holder would only state the numbers and animal types culled. The compensation equivalent could not be determined until culling is completed and a production community culling summary is available. For details on payment procedures see section 6.5.

[218] E.g. to prevent dead birds being carried into the production community's territory by roaming dogs, etc.

Small-scale producers and backyard holders usually have very low or no bio-security. Many bio-security measures seem unrealistic to achieve for these production systems, e.g. closed poultry production and the like. However, there are measures to reduce animal disease risk even on a small-scale or backyard production level. Ensuring access to clean water, fencing birds' farmyards and separation of sick birds are measures that can reduce the risk of attracting Avian Influenza and that can be implemented in small-scale and backyard production systems. We recommend providing explicit incentives for improving bio-security in production communities however in order to forward the process of improving bio-security in the small-scale and backyard sector. Similarly to commercial livestock producers, we therefore suggest differentiating compensation levels in order to provide incentives for production communities to undertake those kinds of measures, e.g. participation with disease awareness programs or the like. We will denote production communities that verifiably undertake predefined measures to reduce animal disease risk as *bio-secure production communities*.

In the previous section different compensation rates within the commercial sector have been introduced, depending on the level of bio-security. It is recommended to apply a similar differentiation of compensation rates within the small-scale and backyard sector. As the mere formation of a production community is a first level of improved bio-security in this sector, compensation rates should be equivalent to moderate bio-security farms of the commercial sector. Accordingly compensation rates of bio-secure production communities should be equivalent to high bio-security farms of the commercial sector.

This leads to the following recommendation for compensating losses of small-scale and backyard livestock holders:

19. ***Animal losses due to culling incurred by small-scale and backyard holders of animals that are member of a production community should be compensated according to the bio-security level of the production community.*** Animals from production communities that do not take specific precautions should be compensated at rates of 75% of the type-specific animal value for healthy animals and half of these rates for visibly diseased animals. For production communities adhering to certain verifiable bio-security measures this rate should be increased to 90%. The compensation payment is community-based, and individual compensation therefore does not depend on the health status of the own animals, but on the health status of all animals culled in the community. This incentive structure increases collective responsibility and communal accountability for animal health.

6.3.4.3. Compensation outside of production communities

Although the organisation of small-scale and backyard livestock holders in production communities would be beneficial from a disease risk management point of view, this is an new approach at this stage and needs to be tested and evaluated in different transition and developing countries before its feasibility can be finally assessed. Experiences in countries such as Vietnam seem to indicate that it is possible to channel compensation payments through existing Communities (see section 3.2.3). However, it is clear that in some regions or countries the formation of production communities may not be feasible at all. It requires existing social structures, which may not exist in outskirts of large cities with a high turnover of migrant population, for example. It also requires trust in existing institutions, as the incentives provided are future compensation payments, and therefore a minimum of trust is required that commitments before an outbreak will be valid after the outbreak. If no trusted institutions are available, such an approach cannot work. Furthermore some behavioural preconditions have to be fulfilled to form a production community: In an environment with an antagonised neighbourhood, the cooperation necessary among livestock holders to form a production community may not be feasible. In very sparsely populated environments, the reduction in animal disease risk caused by production communities may not justify the transaction costs of forming and running a production community.

Although the most common situation currently, an environment of atomised backyard holders of livestock is most problematic from a risk-management point of view: Backyard holders are very difficult to reach – both to increase awareness for prevention/bio-security, and for control measures in case of an outbreak. Individual compensation of unregistered livestock holders also burdens the Veterinary Service with high transaction costs of dealing with a large number of small-scale and backyard livestock holders individually. The compensation guidelines should therefore provide clear incentives for small-scale and backyard livestock holders to form production communities, if the system is assumed to be feasible in the particular country. We therefore suggest providing the lowest compensation rates compatible with early disclosure for individual compensation of unregistered livestock holders, i.e. 60% of the type-specific animal value for healthy animals.

It has to be emphasized that compliance with restrictions has to be enforced through controls and sanctions, as there is no sense of collective responsibility or of communal accountability as it is the case for livestock holders in production communities. Controls seem to be complicated as we are dealing with small-scale and backyard farmers here who may be located in remote areas, and possibilities for sanctioning are rare. For unregistered backyard holders outside of production communities, there is no alternative to enforcing compliance with restrictions other than through a policing approach.

This leads to the following recommendation for compensating losses of small-scale and backyard livestock holders outside of production communities:

20. ***Losses due to culling of animals of small-scale and backyard livestock holders outside of production communities should be compensated at rates of 60% of the type-specific animal value for healthy animals and half of this rate for visibly diseased animals.*** Low compensation rates provide an incentive for the formation of production communities, if introduced in the country. Policing of veterinary restrictions is needed however to ensure compliance of the small-scale and backyard livestock holders outside of production communities with veterinary restriction, as social control mechanisms do not exist.

6.3.4.4. Higher compensation for first notification

A compensation rate of 60% of the animal value in case of atomised backyard holders of livestock may not be sufficient to induce notification of the Veterinary Service. We do not recommend providing higher compensation rates, because we want to induce an increase of bio-security in the small-scale and backyard sector, which only seems to be possible in the framework of production communities. However, it is possible to introduce a higher *first-notification compensation rate* of 90% of the type-specific animal value for the compensation of small-scale and backyard livestock holders. Any system of first-notification compensation rates has to be introduced on an experimental basis first and has to be evaluated carefully.

The economic justification for such a higher rate for the first individual reporting a disease outbreak is as follows: The individual decisions on notification and cooperation are quite different for a livestock holder supposed to notify a first outbreak and a livestock holder supposed to cooperate with culling. The reason is that it could be easy for livestock holders who observe disease symptoms to sell their healthy animals on the market. In contrast, it is reasonable to assume that the probability to successfully avoid culling when located in a culling zone is lower, since control measures have already commenced. Also, non-cooperation with culling orders bears an additional risk of getting sanctioned for violating legal standards. These considerations on notification and cooperation decisions suggest that minimum compensation rates aimed at inducing early disclosure would need to exceed minimum compensation rates aimed at inducing cooperation with culling teams. This is particularly the case for the very first outbreak in a region. Once an outbreak has occurred in a region, the alertness of the Veterinary Service and the awareness of consumers increases. That makes non-notification a less beneficial strategy for livestock holders. Therefore higher compensation rates for livestock holders that notify disease outbreaks in a particular region may be needed at first to provide additional incentives for early disclosure. Increased compensation rates for first notification in a region are called *first-notification compensation rates*. It has to be stressed that there is little experience so far with applying higher compensation rates for first notification, but current experience suggests the need for additional incentives, especially in the case of smallholders. As a summary document of recent FAO consultation on compensation stated, “the potential merits of rewards for reporting under certain conditions […] need to be explored. […] it is clear that the current system in many countries does not result in reporting of disease by smallholders”.[219] The higher compensation rate would apply only for animals of the individual holder that reported the disease outbreak. A higher first-notification compensation rate is only recommended for backyard holders of animals. Higher compensation rates are not very likely to have significant impact on the willingness of commercial farmers to notify rapidly, as they have significant additional burdens to bear (e.g. business interruption losses), compared to which the increase in compensation for animals sculled becomes less relevant.

This leads to the following recommendation for compensating losses of small-scale and backyard livestock holders:

21. ***An additional incentive for early disclosure could be provided by a special first-notification compensation rate of 90% of the animal value for backyard holders***. First-notification compensation rates of 90% of the animal value should only be considered for the compensation of the first individual livestock holder in each region that notifies the outbreak of a particular disease.

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[219] FAO (2006a), p3

6.3.4.5. Summary of compensation of backyard livestock holders

The following table summarises the guidelines for the compensation of small-scale and backyard livestock holders and emphasizes how incentives for different individual risk management activities are provided:

Table 22: Overview of compensation principles for small-scale and backyard livestock holders

	Backyard holders outside of production communities	**Backyard holders in production communities**	**Backyard holders in production communities applying bio-security measures**
Characteristics	Not registered Individual compensation	Registered through production community Community-based compensation	Registered through production community Community-based compensation Verifiably undertake predetermined risk-reducing measures
Incentives for registration	Higher compensation only possible through formation of a production community	Application of the more beneficial compensation scheme for production communities requires fulfilling registration duties	
Compensation rate healthy animals	60% of type-specific animal values	75% of type-specific animal values	90% of type-specific animal values
Compensation rate diseased animals	Half of the rate for health animals is compensated for visibly diseased animals, no compensation for dead animals		
Compensation ceiling	Maximum number of animals to be compensated per livestock holder		
Incentives for early disclosure	First-notification compensation rate of 90% of type-specific animal values for healthy animals, half of the rate for visibly diseased animals, no compensation for dead animals	Community-based compensation, i.e. the individual share of a member in the compensation paid to the community depends on the share in the number of animals culled, independent of the disease status of the individual's animals. This creates communal accountability, as the total compensation provided to the community decreases with a higher share of diseased or dead animals.	
Incentives for bio-security	Indirect incentives through incentives for registration	Higher compensation for higher bio-security level Community-based compensation creates collective responsibility for the community's animal health status	
Compliance with veterinary restrictions	Policing approach needed to ensure compliance	Communal accountability, complemented by enforcement measures (less than under policing approach)	

6.4. Governance arrangements

The governance arrangements for GERFAE should address the following issues:

1. The institutional platform chosen to host and manage GERFAE.
2. The governing bodies and structures needed to safeguard transparency, accountability and efficiency of stakeholder involvement and activities; and to review, develop, monitor and evaluate GERFAE policies, operational and funding guidelines.
3. The application process for funds and fund dispersal, and the monitoring and evaluation of these processes and implemented measures financed by GERFAE.

These points will be briefly discussed below, using examples from other functioning funds to illustrate the different governance arrangements that could be considered.

6.4.1. Designated body for hosting and managing GERFAE

There are three alternative hosting arrangements that can be considered when discussing a home for GERFAE:

- Option 1: One institution hosts and administers the fund. This would mean that one institution would take full responsibility of the day-to-day running, management and execution of GERFAE activities – e.g. for the application processes, fund dispersal, provision and replenishment – with other organisations represented in the governance structures to ensure transparency, accountability and correct implementation of guidelines. OIE, FAO and the World Bank are examples of possible hosting organizations.

- Option 2: A collaboration of agencies with one organisation functioning as Trustee. This would mean two or more agencies playing key roles in the running, management and execution of GERFAE activities, each within their respective sphere of competence. An example of this model is the Global Environment Facility (GEF), where the UNDP, UNEP and World Bank are “Implementing Agencies” of GEF functions, with the World Bank designated as Trustee of the GEF Trust Fund serving in a fiduciary and administrative capacity.

- Option 3: Two institutions host and administer distinct GERFAE activities. For example one host institution could be responsible for the emergency response planning component of GERFAE, whereas the financing of emergency response measures would be managed and administered by a second institution, as suggested under Approach B (section 6.1.2).

A fourth alternative is to set up a new home for GERFAE, but due to the cost and time implications of this, over leveraging existing experience, structures and facilities, this option will not be considered. For example the World Bank’s current experience with a donor funded mechanism for the response to Avian and Human Influenza is valuable as it includes, among other measures, compensation to livestock owners. GERFAE should build upon such and other valuable institutional experiences.

An example of the first hosting arrangement is the Central Emergency Response Fund (CERF) which is hosted by the United Nations in New York, under the management of the Under-Secretary General for Humanitarian Affairs, who is also the UN Emergency Relief Coordinator and head of the UN Office for the Coordination of Humanitarian Affairs (section 4.2.1). As mentioned above an example of the second arrangement is GEF which operates, on the basis of collaboration and partnership among the "Implementing Agencies" UNDP, UNEP and World Bank, as a mechanism to facilitate "cooperation in GEF-financed activities by multilateral development banks, United Nations agencies and programs, other international institutions, national institutions and bilateral development agencies, local communities, non-governmental organizations, the private sector and academic community" in order to "assist in the protection of the global environment and promote thereby environmentally sound and sustainable economic development".[220]

The three leading agencies of GEF are designated to ensure "the development and implementation of programs and projects which are country-driven and based on national priorities" and actions that are "strongly influenced by existing national polices and sub regional and regional cooperative mechanisms". Each Implementing Agency has a particular field of competence. In addition, the World Bank is the designated Trustee of the GEF Trust Fund, holding in trust the funds, assets and receipts which constitute the GEF Trust Fund and managing and use them in accordance to GEF provisions, keeping them separate and apart from all other accounts and assets administered by the World Bank.[221]

In the context of GERFAE, to facilitate optimal coordination of emergency planning and response, both activities should be funded by one mechanism under one management structure. This makes the hosting arrangements outlined in Options 1 and 2 preferable over the third suggestion of having two agencies distinctly manage the two potential functions of GERFAE. Of the two preferred models either could be implemented. The more explicit collaboration of Option 2, where in the context of GERFAE the term "Implementing Agency" would be more accurately replaced by the title "Technical Agency", is perhaps more appropriate to further encourage streamlining of global efforts in the area of animal disease risk management and involve expert input within the more day-to-day activities of the fund. By explicitly involving agencies with core spheres of expertise to be responsible for: monitoring and supporting eligible countries in the development of their emergency planning and response plans; ensuring that necessary actions, responsibilities for planning and implementation, cost and timing estimates are appropriately defined within these plans; promoting the purpose of the fund and ensuring coordination of these plans with other related non-GERFAE funded efforts regionally and in-country; and the monitoring and oversight of GERFAE-financed measures, appears to be the more holistic approach for a coordinated and efficient animal disease risk management. By encouraging interagency collaboration in such a manner it is more likely that coordination with other donors, stakeholders and activities is safeguarded. Therefore it is recommended that one institution should manage the day-to-day running and management of GERFAE (in alignment with Approach A, section 6.1.2), possibly in a Trustee function, in close cooperation with expert Technical Agencies. In particular the Technical Agencies should monitor the preparation and development of eligible country-led emergency planning and response plans to be funded by GERFAE.

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[220] GEF (2004)

[221] GEF (2004)

This leads to the following recommendation for the institutional platform for GERFAE:

22. ***GERFAE should be created through a collaboration of relevant institutions. One institution should manage the day-to-day running and management of GERFAE, possibly in a Trustee function, in close cooperation with expert Technical Agencies.*** Such an arrangement would recognize the need for institutional arrangements to optimise efficiency and cost effectiveness of GERFAE activities, ensuring emergency planning and response plans to be funded by GERFAE are country-driven, appropriately prepared and executed and part of a greater, coordinated framework of national, regional and global animal disease risk management. Existing institution expertise should be leveraged.

6.4.2. Organisational structure of GERFAE

There are many examples for the organizational structure of global funds that could be used as a template GERFAE (see section 4). Other examples are:

- **The Global Environment Facility (GEF)**:[222] GEF has an Assembly, a Council, a Secretariat and a Scientific and Technical Advisory Panel to provide appropriate advice. In addition the three Implementing Agencies have established a process for their collaboration.
    - The GEF Council is the main governing body. It is comprised of 32 member countries, including developing and developed countries, as well as those with economies in transition. The Council meets semi-annually or "as frequently as necessary at the seat of the Secretariat to enable it to discharge its responsibilities"[223]. All GEF full-size projects must be approved by the GEF Council.
    - The GEF Assembly is comprised of all the countries that are members of the GEF. It meets once every three years to review the policies and operations of the GEF on the basis of reports submitted by the Council. Amendments to the GEF Instrument – the document that established the GEF – can be made only by the Assembly.
    - The GEF Secretariat serves and reports to the Assembly and Council. It includes staff members seconded from the Implementing Agencies and coordinates the implementation of GEF activities such as projects, programs, and decisions of the Assembly and Council.
    - Implementing Agencies are responsible for creating project proposals and for managing GEF projects. They are accountable to the Council for their GEF-financed activities and for the implantation of operational policies and decisions of the Council within their respective areas of competence.

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[222] Information taken from GEF (2004), p13-17

[223] GEF (2004), p14

  - The Scientific and Technical Advisory Panel (STAP) provides objective scientific and technical advice to the GEF. In addition a Monitoring and Evaluation Unit conducts reviews of GEF's work and publishes lessons learned so that the GEF's effectiveness can enhanced.

- **UN Central Fund for Influenza Actions (CFIA)**:[224] The proposed CIFA, designed as a pooled funding mechanism to support a coordinated UN response to AHI, will be governed by one inter-agency Steering Committee composed of high level Avian Flu focal points for each participating agency and supported by a Secretariat[225] and an Administrative Agency (UNDP) responsible for the maintenance of the fund account, receipt of donor contributions and the disbursement of funds upon instruction of the Steering Committee. The Steering Committee will be responsible for ensuring that the CFIA operations are in line with the Terms of Reference of the fund and will develop them as appropriate detailing rules and procedures. In addition, the Steering Committee will be tasked with reviewing and approving project submission by participating UN agencies, making funding decisions by consensus, meeting once a month or anytime it should be required to do so.

It is recommended that the GERFAE should also follow the standard governance structure of a Governing Board, an Advisory Panel and a GERFAE Secretariat. The Governing Board should represent donors, eligible countries and, depending on the hosting arrangements, the leading Technical Agencies. The composition of the Board should reflect the funding efforts of all donors and the role of eligible countries and their regional organizations to encourage eligible country ownership and voice within the GERFAE function and process. It could potentially include observing or nonvoting members from other stakeholder groups that have an interest or expertise in animal health, such as the veterinarian, farmer organization, food industry community or NGOs that can assist governments in implementation of eligible measures. The Technical Agencies should be responsible for establishing the Advisory Panel, which could also include these other stakeholders groups, to provide objective scientific and technical advice to the GERFAE Governing Board.

In composing the Board membership the focus should be on securing the coordination of GERFAE-funded activities with other donor initiatives and establishing the function of GERFAE within the larger network of donors, funds and programmes. The aim is to safeguard against activity overlap, redundancy of initiatives and to ensure efficiency of coordinated action. The role of the Governing Board, with advice from the Advisory Panel and Technical Agencies, will be to ensure transparency, accountability and efficiency of stakeholder involvement and activities, and to review, develop, monitor and evaluate GERFAE policies, operational and application funding guidelines. The Governing Board can either prescribe the regularly-reviewed and updated rules of application, to then be implemented by the Secretariat on a day-to-day basis e.g. CERF, or make funding decisions by consensus and meet to do so whenever an application to GERFAE is submitted by an eligible country, e.g. such as CFIA. The minimum requirements for the GERFAE Secretariat would be at least one person with experience in financial management and another one in procurement. However its staffing would depend on the overall governing arrangements and structure.

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[224] Information taken from Terms of Reference for UN Central Fund For Influenza Actions (CFIA).

[225] The small Secretariat will be composed of a seconded person from one of the participating UN agencies to process requests and ensure follow up of Steering Committee decisions.

This leads to the following recommendation for the governance structure for GERFAE:

23. ***GERFAE should have a governance structure which includes a Governing Board, an Advisory Panel and a Secretariat.*** The structure must safeguard against overlap and redundancy of initiatives to ensure efficiency of coordinated action and to build eligible country ownership and voice within the GERFAE process. It should ensure transparency, accountability and efficiency of stakeholder involvement and activities, and review, develop, monitor and evaluate GERFAE policies, operational and application funding guidelines.

6.4.3. Application process

It is recommended that the application process of an eligible country for GERFAE funding should be developed in the future once the fund is operational by the GERFAE's Governing Board, with guidance from the Advisory Panel and Technical Agencies, in line with the fund's operational principles and eligibility criteria. This should not be designed before the governance structure and principles of operation are established.

Once designed the process should be reviewed regularly, adapted and developed as appropriate to ensure continued efficient decision making and operational activity. The established procedure must clearly outline the application, decision making and fund dispersal process for eligible recipients, i.e. the application format required, the eligibility criteria that must be met to make an application valid, e.g. the presence of a detailed, Technical Agency-approved and costed response plan covering eligible measures for funding, evidence of an eligible disease outbreak in-country etc., and who ensures these criteria are met and allows funds to be disbursed.

Given the discussions and recommendations of previous sections, GERFAE-funded measures will be implemented by recipient governments, with technical support from the Technical Agencies and other partners where appropriate, according to predefined and Governing Board/Technical Agency approved emergency planning and response plans. These plans, in addition to outlining and budgeting the practical contingency plans, will elaborate on the tasks and responsibilities of government and its implementing partners, if any, and on how funds should be disbursed to ensure maximum efficiency in plan deployment. As part of its role in defining the fund management and operational principles, the Governing Board must specify if implementing partners specified in the country plans, such as the Technical Agencies, will be eligible for direct financial support from GERFAE when these plans are mobilized, or whether funds should be channelled only to recipient governments to be redistributed to its chosen implementing partners if any.

The Governing Board must also approve regular reports on the activities of GERFAE, prepared by the Secretariat, containing the necessary information to meet the principles of accountability and transparency. In addition a Monitoring and Evaluation mechanism should be established to conduct reviews of

GERFAE-financed measures and publish lessons learned so that GERFAE effectiveness can be enhanced and the planning and response process improved at all levels.

This leads to the following recommendation:

24. ***Once the fund is operational the GERFAE Governing Board, with guidance from the Advisory Panel and Technical Agencies, must establish an application and funding process that is in line with the fund's defined operational principles and eligibility criteria.*** The process should be reviewed regularly, adapted and developed as appropriate to ensure continued efficient decision making and operational activity. In addition to regular reporting on fund activities, a Monitoring and Evaluation mechanism should be established to conduct reviews of GERFAE-financed measures to improve effectiveness and the planning and response process at all levels.

6.5. Payment procedures / monitoring

The question of payment procedures and monitoring of GERFAE payments to eligible countries can be addressed at two levels: First at the level of the fund itself i.e. the relation between the fund and recipient governments and secondly at the level of disbursement of compensation payments to livestock holders through a Country Compensation Mechanism. In both cases, it is essential that a clear audit trail is established. In the case of GERFAE itself and its relation to both donors and recipient governments it is essential that it provides for and sets aside the necessary budget and obtains the necessary expertise to ensure that the plans for fund disbursement are sound and workable i.e. there is 'pre-vetting' and that following a disbursement a verifiable audit trail exists. Establishing this type of audit trail mechanisms for recipient governments is a well-established practice of donors and will not be discussed here in depth.

The major challenge is, however, to have a similar audit trail at the level of the disbursement to the final beneficiary through the Country Compensation Mechanism that any beneficiary country will have to establish to qualify for GERFAE support (see section 6.1.5). An extensive discussion of this issue has been presented recently by the World Bank.[226] This sets out the elements needed to ensure efficient and transparent management of a compensation fund as follows:

- Provision of the legal basis for establishing responsibilities for compensation fund administration. It is clear from case studies that it is essential to ensure clear lines of responsibility and communication between the institutional structures from the central to the local level in advance of any outbreak occurring;
- Conducting a financial needs assessment (how much will compensation cost) and a regularly updated assessment of what compensation levels should be applied;
- Identification of the payment agencies needed to get the funds to the beneficiaries. This should include a delineation of how funds should flow from any compensation fund which is set up to the central implementing agency, to the local level and ultimately to the final beneficiaries;
- Deciding on the payment instruments (cash, bank transfers, vouchers, and so forth). While cash payments are generally considered most appropriate for small-scale subsistence producers for larger commercial farmers payments via the banking system are clearly more appropriate. Experience with vouchers was generally considered unsatisfactory due the issues of understanding associated with these as well as the potential difficulties of cashing in the vouchers;
- Designing the basis on which payment will be made, that is, certification. Such culling and compensation certificates should serve the dual purpose of certification of culling and evidence of receipt of cash (or if need be as a payment entitlement voucher) and should reflect ownership, date, location, category, number of birds culled, unit compensation and total compensation;
- Communication of the time frame for payment;
- Monitoring disbursements;
- Operational and financial audits.

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[226] World Bank (2006a) and personal communication from Patricia McKenzie at the World Bank

The document also emphasises the importance of social accountability mechanisms: "it is […] essential to develop a strategy to engage farmers, including smallholders, in scrutiny of the official accountability processes. The participation of community-based organizations, NGOs, and citizens in general has proven to be one of the most critical factors for ensuring successful accountability arrangements and in mitigating the risk of funds being diverted." This underlines the need of the participation of stakeholder organisations in the Country Compensation Mechanism and the advantages of an community-based compensation approach, as is suggested through the introduction of "production communities", that will not only increase social accountability regarding animal health, but also regarding possible compensation payments.

An example of how control arrangements for a compensation fund for poultry have been set up in practice is the case of Albania.[227] The key elements are set out below:

- It is required that all forms to be used to record cullings and compensation claims be pre-numbered and recorded in the database of the Compensation Fund. All unused forms, as well as any invalid or incorrectly completed forms, must be returned to the Compensation Fund when the culling records are submitted.

- Compensation payments to animal owners will be in cash or by bank transfer or postal transmission. Vouchers or animal replacements are not allowed. Payments to be made within four weeks from the date of culling. *The detailed procedures given in the project document are described in the box on the following page.*

- The same document also provides detailed arrangements for reviews and audits for the Compensation Fund. These include periodic operational reviews to confirm the validity and legitimacy of the compensation payments made, based on the verification of compensation claims and payments made in randomly selected samples of villages and territories; this verification is to include: checking against the database maintained by the Compensation Fund, collecting and verifying information available and obtained at the village level, checking with individual poultry owners, checking forms and reports, etc. Financial audits are carried out in accordance with International Standards on Auditing (ISA), and the World Bank's guidelines on auditing. During project implementation, the project's financial management arrangements are to be supervised in two ways: (i) review of the project's quarterly interim unaudited financial reports and as well as the project's annual audited financial statements and auditor's management letter; and (ii) during supervision missions, review of the project's financial management and disbursement arrangements.

The example of Albania illustrates that payment procedures of Country Compensation Mechanisms are a challenge, but that also a significant body of experience is currently accumulated to provide reliable audit trails and the required accountability for donors, including for compensation of communities of smallholders. GERFAE will not only need to built on this experience, but would, through its guidelines and requirements, become an important mechanism for identifying and promoting best practices.

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[227] World Bank (2006d)

Culling and Flow-of-Funds Arrangements for the Compensation Fund - Albania

The fund distinguishes between the owners of village and backyard poultry and commercial poultry holders. It is envisaged that owners of village and backyard poultry will, at the time of culling, receive a Culling Certificate noting the date and the type and number of birds culled. Each certificate is to be signed by all four members of what are termed Local Supervision Committees (LSC) and countersigned by the poultry owner. The certificate is to be completed in four copies: one for the poultry owner, one each will be attached to the village summary certificate, third will be kept at the commune/municipal administration and the fourth will be send to the Project Management Unit handling the procurement and finance management of the project. Certificates not signed by all members of the LSC and the poultry owner are considered invalid. Based on these individual poultry owner certificates, the LSC will compile a Village Summary Poultry Culling Record. All four LSC members will sign and the poultry owners will countersign this list of birds culled and their owners. Forms not signed by all four members of the LSC are invalid, and all claims included on an invalid Village Summary Poultry Culling Record are rendered invalid as well. The village summary culling record is the official record that establishes the poultry owners' right to compensation from the Compensation Fund. The summary list should be completed in 4 copies. One copy to be posted in a public space, one to be kept at the municipal/commune administration, a third copy with the attached individual certificates to be sent to the secretariat, and the fourth copy to be sent to the PMU handling the procurement and finance management.

The commune/municipality will compile a summary report based on the summary village reports. The pre-numbered commune summary forms are provided by the secretariat. The summary report is to be signed by the mayor. One copy to be sent to the PMU handling the procurement and finance management of the project. A copy with all attached summary village reports and the individual certificates to be sent to the secretariat. For village and backyard poultry owners, payment are to be made in person and in cash at the village level, in a public place. The funds for such payments will be transferred by the Compensation Fund through the banking system to the commune/municipality. The farmers will receive the compensation amounts from the commune/municipality cashier. Payment to the poultry owners will be made by the cashier and supervised by the two community representatives on the LSC, based on the village summary culling record kept by the commune/municipality and cross-checked against that kept in the village. To receive payment, each poultry owner will be required to present his/her culling certificate; the date and amount of payment is to be recorded on the certificate and countersigned by the poultry owner. All payments made to individual poultry owners are recorded on both copies of the village summary poultry culling record kept by the commune/municipality, and each poultry owner must sign for the payment received on both copies to confirm receipt of payment. These two copies of the village summary poultry culling record thus become the "village culling-and payment record". They must be signed by the commune/municipality and the two community representatives on the LSC. The commune/municipality then completes the Summary Report by entering for each village the amounts paid, by village and by type of poultry. The commune/municipality keeps one copy and submits the other to the Compensation Fund, with a copy of each village's culling-and-payment record attached.

For commercial enterprises the culling should be undertaken in the presence of the owner, a representative from the regional veterinary directorate, and one official from the commune/municipality. All three to sign the list of culled birds. The blank forms are provided by the secretariat. One copy of the form is to be kept by the owner of the commercial enterprise, the second copy is to be retained at the municipal/commune administration and the third copy is to be kept at the secretariat. For commercial poultry farmers that have bank accounts, the compensation payments are to be made through the banking system, typically through the treasury accounts. The Compensation Fund will transfer the funds to the treasury accounts, which will instruct its branches in the appropriate locations to credit the account(s) of the eligible recipients. The Compensation Fund is to inform the PMU of the dates and mounts of payments made, with appropriate documentary evidence.

Experience with other supranational compensation mechanisms such as the EU "Veterinary Fund" shows that creating an audit trail for compensation costs is feasible, but can lead to a very high administrative burden for performing the audits and also lead to significant delays. Therefore GERFAE needs to delegate as much auditing functions as possible through the use of independent financial auditors that should already be contracted when a Country Compensation Mechanism is set up, somewhat similar to the approach of the Global Fund to Fight AIDS, Tuberculosis and Malaria (see section 4.2.2). The contract would be activated once an outbreak occurs, so that during an outbreak random checks in the affected areas can be conducted to check the audit trail on an exemplary basis (i.e. before the end of the fiscal year). It would increase the feasibility of this approach if the related costs were to be included as eligible measure for which GERFAE would provide support as part of the emergency planning/response process.

This leads to the following recommendation:

25. ***Once the fund is operational the GERFAE Governing Board, with guidance from the Advisory Panel and Technical Agencies, must establish an audit and monitoring processes, taking into account experiences of the ongoing projects funded through the Global Program for Avian Influenza.*** The processes should be reviewed regularly, adapted and result in GERFAE guidelines and requirements for eligible countries. GERFAE needs to delegate as much auditing functions as possible through the use of independent financial auditors, to be contracted when a Country Compensation Mechanism is set up.

6.6. Managing the risk of GERFAE

The functions of GERFAE in global animal disease risk management have been specified before. They involve the financing of measures regarding:

- Emergency response planning;
- Emergency response measures with respect to this planning, including compensation payments to farmers affected by culling.

From a purely financial point of view, GERFAE first and foremost needs to have capital at its disposal in order to fulfil its role in global animal disease risk management, i.e. to (co-) finance the above mentioned activities.

Without adequate provisions or in the absence of risk management measures, in case of a relevant outbreak of animal disease GERFAE has to provide funds rapidly to support emergency measures in eligible countries, even before related donor contributions are received. The timing of contributions to GERFAE and the release of funds for emergency measures can therefore be expected to differ, leading to a temporary deficit:

- Donor contributions to GERFAE may increase after an outbreak, but due to the budgeting procedures of many donors, significant time lags may arise between the points in time when funds are needed and when funds are available;

- Animal diseases risk is cumulative, i.e. individual risks (of a professional farmer's herd, a production community's stock of animals, etc.) and risks of whole regions and even countries are not independent, but positively correlated. Even if GERFAE's means are on average sufficient to follow its commitments, there will be periods of high losses, when expenses exceed funds available.

The challenge is to find a financing strategy that addresses these temporary shortcomings. In case of a large global animal health crisis, GERFAE could face a structural deficit, i.e. even when assured future income is taken into account, present financial commitments cannot be financed. The challenge is to prevent structural deficits which could arise in case of a catastrophic animal disease crisis.

Risk management and financing strategies should be guided by the following principles to ensure GERFAE will be able to honour its financial commitments to eligible countries even in case of relevant large-scale/numerous animal disease outbreaks:

- The execution of re-active animal disease risk management in developing and transition countries strongly depends on the availability of GERFAE's funds;
- As it is vital for re-active animal disease risk management to immediately commence containment and eradication measures, GERFAE must always have funds available, i.e. has to have a certain amount of working capital at its disposal;
- The financing of GERFAE expenditure and expenditure risk is completely provided by donors. Monetary contributions by recipient countries are not a realistic option. Regarding financing animal disease risk, only in-kind contributions by recipient countries will be considered, or

earmarked contingency co-financing fund by recipient governments where appropriate. However these sources of financing will be considered and taken account of in each country's prepared and costed emergency response plan;

- Depending on the severity and number of outbreaks, GERFAE's working capital could be depleted within a rather short time. GERFAE has to be protected against financial incapability, since denial to follow its commitments when the fund is depleted is not a preferred option;
- No international risk pool like UN CERF exists which could provide ad hoc protection against shortcomings of GERFAE by simply entering this pool. GERFAE therefore has to find its own solution to ensure financial solvency.

The following will be discussed as possible, but not exhaustive, options that could be considered to address temporary and structural deficits:

1. Maximising initial capital available within the fund;
2. Reducing expenditures in crisis situations;
3. Contingent loans and grants;
4. Risk transfer through reinsurance and Alternative Risk Transfer (ART) instruments.

Before various risk management strategies can be considered however it is first important to understand the risk to be managed and financed.

6.6.1. Understanding and managing GERFAE financial risk

Financing emergency response planning and emergency response measures involves varying outlays of capital from GERFAE. The development of a risk management strategy to cope with these varying costs requires understanding their underlying cause and structure. Emergency preparedness must be accomplished before and independent of the occurrence of disease outbreaks to maximise the ex-ante benefits of contingency planning with respect to operational timeliness and efficiency in the event of a response and for a country to be eligible for GERFAE funds (section 6.1.5). Therefore the costs associated with emergency response planning (if Approach A is followed) can be planned for every budgetary period. They do depend on the realisation of animal disease risk, e.g. serious outbreaks of disease A in period 1 may make it necessary to allocate more funds to preparing countries for outbreaks of disease A in period 2, but for each budgetary period there is little variability in these costs during the period itself, i.e. emergency preparedness expenses are determined and known for a budget period when budget plans are developed.

Capital needed to finance emergency response measures cannot be estimated so easily. There may be years, or budgetary periods, without any disease outbreaks in recipient countries. Conversely there also may be periods with numerous and/or large-scale disease outbreaks, which would require significantly more funding from GERFAE. That means total capital outlays for emergency response measures during a given budgeting period are variable. They are not purely stochastic, driven solely by epidemiological factors however; there is crucial human influence on the cost of emergency assistance required to thoroughly cope with animal disease outbreaks. Firstly, individual animal producers have a significant influence on the overall costs of a disease outbreak originating on their premises, since their decision to disclose the disease early could make the difference between a local and immediately contained disease outbreak and a global animal health crisis. Secondly, national institutions in recipient countries influence animal disease risk, such as Veterinary Services, the police, agricultural ministries and farmers' associations for example. Their performance in carrying out tasks designated to them in the pre-defined emergency plans, e.g. avoiding animal movements into or out of restriction zones or comprehensively culling all animals of a certain species in a culling zone, critically determines the time it takes to eradicate a disease, the number of animals affected and hence the response cost. Thirdly, international animal health institutions (including GERFAE) can potentially influence animal disease risk. For example, these organisations may influence the quality of preparedness and response in recipient countries; their performance with respect to making funds immediately available can also determine the timeliness and success of executed emergency plans and measures in the case of an event e.g. culling, and so on.

Therefore while emergency preparedness costs are deterministic and known, expenditures for emergency response are variable and unknown for each budgetary period, which poses a risk to the financial viability of GERFAE. The clearest way to illustrate this risk is through a probability density function of potential GERFAE capital outlays during a budgetary period, see figure below. For any amount of GERFAE expenditure chosen, the probability density function gives the probability that actual GERFAE expenditure during a budgetary period will be less than or equal the chosen amount by considering the area under the probability density function to the left of that value.[228] As animal disease risk is cumulative, the probability density function is steep on the left and flat on the right. That means the probability is high that GERFAE expenditures are moderate, but there is a small probability that catastrophic disease outbreaks happen which require severe emergency measures and cause large expenditures. This is a typical characteristic of catastrophic events and of livestock disease risk (see Part III).

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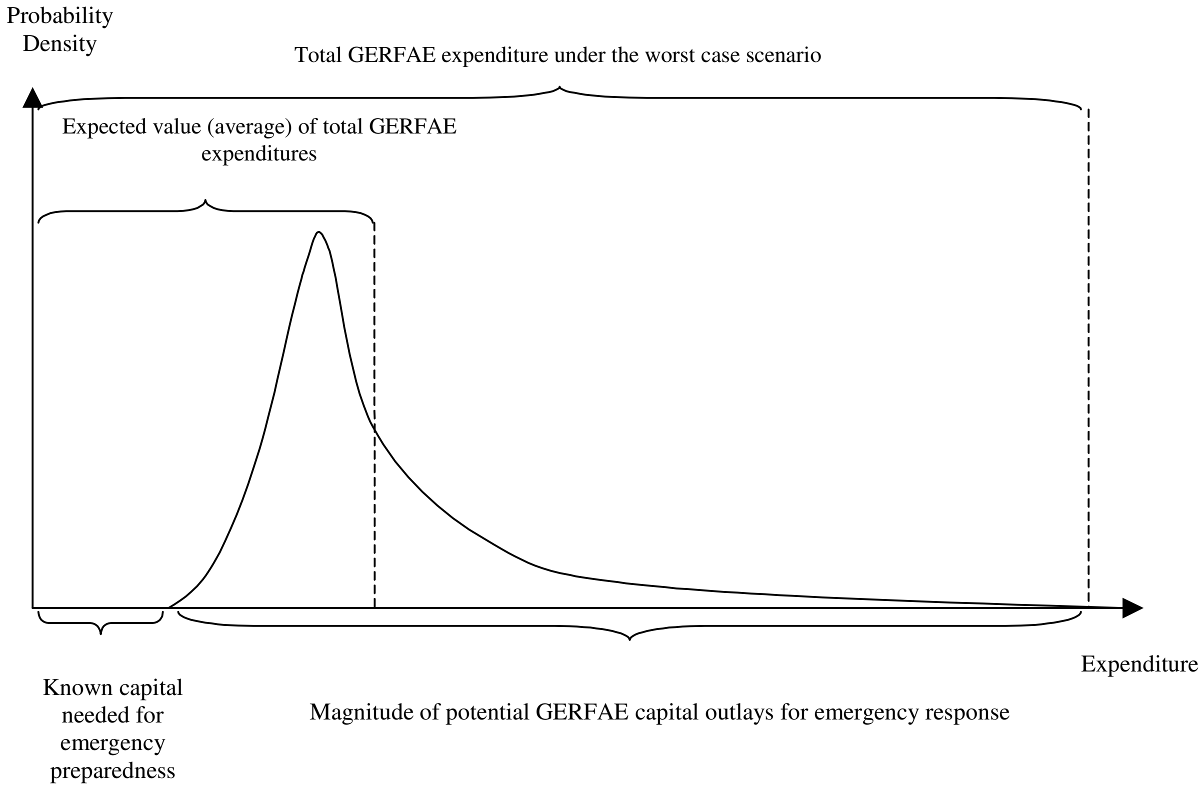
[228] As the area under the probability density function denotes probabilities, the total area under this function is defined as 100%, or one.

Figure 2: Hypothetical probability density function of total GERFAE expenditure in any given budgetary period



The details of how such a probability density function could be generated for actual GERFAE expenditures from epidemiological models and Monte Carlo simulations will be described later in Annex 1. However for the following discussion it should be noted that the term "worst case scenario" should refer to some statistically defined expenditure value of the probability density function, such as the 99th percentile, which is the modelled maximum expenditure expected to be exceeded only once in every 100 years. These are examples of benchmarks set by rating agencies and regulating authorities for the financial and (re)insurance industries[229] to determine capital holding requirements of institutions to reflect risk they are bearing.

6.6.2. Working capital to finance expected expenditures

It is easy to understand that GERFAE, at the least, has to have sufficient funds to finance emergency response planning (under Approach A, see section 6.1). Furthermore, if no disease outbreaks in a budget period are highly unlikely it is clear that a certain amount of capital is needed within the fund to finance relatively low expenditures which would be needed almost certainly. Together we define this amount as the *minimum* working capital GERFAE needs to a) finance emergency response planning activities planned for a budgetary period and b) to finance operational emergency responses needed with high probability during every budgetary period.

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[229] E.g. Hull (2000), p342

Of course there is also the possibility that within a given budgetary period the actual level of GERFAE emergency response expenditures for disease outbreaks exceeds the level of expenditures associated with high certainty at the beginning of the budgetary period, as illustrated by the shape of the probability density function above. A risk financing strategy should be developed that balances the size of the working capital of GERFAE in a given budgetary period with other financing options, as discussed below, to ensure the fund's financial viability throughout the spectrum of possible expenditure levels required by GERFAE. Ultimately the amount of working capital has to take into account a trade-off of different costs associated with increasing and decreasing its level.[230]

The more self-sufficient the fund, able to cope with higher levels of emergency expenditure without external financing or support, the higher the resulting required working capital to retain this risk. Increasing working capital involves expected opportunity costs of idle funds that could be needed or employed somewhere else by GERFAE or donors[231], as there is a higher the probability that GERFAE's working capital exceeds funds needed to support emergency preparedness and control measures in a certain period. Decreasing working capital increases transaction costs of arranging and activating contingent funds, because the probability that GERFAE's working capital falls short of funds needed to support emergency preparedness and control measures in a certain period increases. This implies that more or larger contingency financing arrangements are necessary to meet the defined capital reserve requirements as the probability that contingent funds are needed increases, as does the associated risk of capital in-flow delays and other administrative complications when coordinating various financing sources.

For example a straightforward risk management strategy to ensure GERFAE can cover its worst case scenario of required expenditures in a budgetary period would be for GERFAE to make an effort to accumulate high donations in order to maximize available capital to match this level. The advantage of holding a large amount of capital within the fund to cover extreme but rare events is that it would provide certainty regarding fund availability for a budgetary period. From a donors' perspective this would facilitate capital allocation and donor financial management planning, since only one donation for every budget period would be required and would avoid potential delays in capital provision, which could occur when contingency arrangements are triggered. However holding a considerable amount of capital to cover events that occur infrequently obviously involves high opportunity costs and an inefficient allocation of donors' capital. These significant disadvantages make this strategy impractical even if the capital could be mobilized from donors in the first place. Furthermore large surpluses in good periods could be a signal for donors to reduce donations in future periods, creating potential adverse incentives to GERFAE management with respect to controlling expenditures. Initial significant contributions from donors could also make it less likely that further donations could be secured from those donors if they were indeed needed.

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[230] See Syroka and Wilcox (2006)

[231] Ibid

The definition of the working capital available to GERFAE should result from a thorough analysis of the overall risk exposure of fund – i.e. a understanding of the distribution in terms of frequency and magnitude of possible GERFAE expenditures during a given timeframe – and respond to overall capital reserves it is expected to hold to cover a maximum level of expenditure during a budgetary period, as defined by the worst case scenario level in the figure above. It should consider the opportunity and transactions costs involved. It is acknowledged that this is not a straight-forward task, as discussed in Annex 1, modelling animal disease risk is a challenging activity and estimates of possible GERFAE expenditures should be treated with caution. Building simulation models that correctly capture the physical relationships between many variables, for many diseases in many countries poses significant scientific, mathematical and programming challenges and may not adequately reflect the risks being modelled. However, it is recommended that GERFAE makes headway in this regard. Studying the nature and costs of previous outbreaks, where possible, and modelling disease risk and running Monte Carlo simulations with respect to these models and budgeted contingency plans, under a range of operational implementation assumptions, is a critical first step that should underpin discussions regarding working capital allocation. Grounding such decisions in quantitative considerations, in the context of the overall risk GERFAE is willing to manage, will result in a more optimal and efficient risk financing solution for the fund in the long-term.

6.6.3. Risk financing strategies to cope with uncertain expenditures

As discussed above, if the realisation of animal disease risk in a certain budgetary period exceeds the working capital available to finance control measures in recipient countries affected by animal disease outbreaks, a strategy has to be developed to cope with such situations in which additional funds are needed.

In general, two different strategies exist. One is simply to reduce expenses; the working capital initially allocated then has to suffice under any scenario of animal disease risk realisation in the period considered. A second approach is to make arrangements for ensuring the inflow of additional funds when they are needed, i.e. contingent funding. Both strategies and options to realise theses strategies will be presented.

6.6.3.1. Reduction of expenses

If no measures are in place to secure additional contingency funds, GERFAE could stop financing re-active risk management measures when its working capital is spent or reduce funding activities when a depletion of fund capital is foreseeable in an actual crisis situation. This may be the only alternative in the case where no additional means can be mobilised in short time. A reduction of expenditures would have to follow a prescribed procedure, which makes sure that the most crucial emergency measures are still undertaken before completely running out of capital rendering GERFAE incapable of action.

As soon as the depletion of working capital due to large-scale or numerous animal disease outbreaks can be foreseen, pending measures have to be chosen according to expected benefits per unit of expected financial support by GERFAE. In such a situation, GERFAE would be principally able to support any bulk of measures whose sum of expected financial support is smaller or equal to the remaining funds. However it is not possible to establish this profitability-ranking through individually assessing single emergency measures, since cross-effects have to be taken into account. Cross-effects capture the fact that expected benefits of certain emergency measures depend on the execution of other measures. That means individual measures cannot be ranked, but there is a choice between financially feasible bundles of emergency measures, i.e. emergency programs. When the depletion of working capital is foreseeable, GERFAE should choose that financially feasible emergency program(s) which maximise expected benefits.

It must be noted that decisions in an emergency situation are not reached in such a formal and technical way as depicted here. However, the aim of maximising benefits under budget constraints is a reasonable guideline for decision-making. Some advantages of this strategy are that critical operations are not completely halted. Plus operating with a fixed amount of capital for each budgetary period provides certainty regarding fund availability and emergency measures affordable in that period. The obvious disadvantage is that a reduction of expenditures in crisis situations is inefficient. Efficiency of emergency programs is the key concern of GERFAE when these programs are planned and prepared. The omission to implement some of these programs or parts of them due to a lack of resources in emergency situations, for which these programs have been designed, is therefore inefficient and wasteful. Furthermore a reduction of expenditures reduces the income and welfare of the population in recipient countries where the omitted measures should have been undertaken. Omitting efficient emergency measures could ultimately burden other countries or even global animal production and population.

If a need to reduce expenditures is foreseeable, GERFAE should make sure that the worst scenarios can be avoided, i.e. remaining funds should be deployed for containment measures to avoid a large-scale disease spread. Although every crisis situation is different, GERFAE should anticipate situations with serious budget constraints. The guiding question is how disease containment can be ensured without sufficient means to carry out prearranged emergency programs. That means the above mentioned prescribed procedure which makes sure that the most crucial emergency measures are still undertaken, before running fully out of capital and being incapable of action, should be seriously designed for various outbreak scenarios and different amounts of remaining capital.

It should be noted that the need to focus on the most crucial emergency measures could lead to an animal health policy which is perceived as unfair. This could happen when means are insufficient to fund eradication (compensation among other measures) in a certain country with high disease prevalence, and the decision is reached to focus on containing the disease spread, e.g. through applying emergency vaccination and intensifying border control. GERFAE has to make sure that it can apply a policy which may be perceived as unfair, and consider what such a policy would mean for future compliance of the deprived country with international animal health standards and GERFAE's requirements.

It has to be emphasized that a reduction of expenditures may be necessary even if arrangements to ensure additional funding have been made. In a case when contingent funding is not sufficient to finance required expenditures, which may be realistic under a catastrophic scenario beyond those envisioned and planned for through rigorous modelling analysis. Hence considering procedures for a reduction of expenses may be a worthy exercise nevertheless.

6.6.3.2. Contingent funding

The aim of contingent funding is to ensure that additional funds are available when they are needed, i.e. in situations when the working capital available is insufficient. We distinguish between three broad contingent funding options, namely:

- Contingent grants from donors;
- Contingent loans from donors, international organizations or banks;
- Risk transfer via insurance or Alternative Risk Transfer (ART) products.

Other options are also possible, although an exhaustive list of risk financing solutions is beyond the scope of this document. The question arises as to why ex-ante contingent agreements should be arranged at all as opposed to negotiating capital provision when capital is needed, i.e. ex-post, once a severe disease outbreak or outbreaks have occurred. The answer is that it allows for *timely* and *reliable* financing, with funds made available immediately under the specifications of a contingency agreement. The timing of funding is critical to the efficient response and deployment of emergency measures, and the security of sufficient funding when needed is a strong incentive for efficient and thorough contingency planning and emergency preparedness. Ex-ante negotiations save time and budgetary surprises in moments when time and money is most scarce.[232]

Before presenting the options, special attention has to be devoted to the mechanism that activates contingent funds and if necessary the amount of funds made available. This mechanism requires a variable, known as index, and the determination of a certain value of that variable, known as a trigger. The specified index can be monitored throughout a budgetary period, and as soon as it reaches its pre-determined trigger value, contingent funding can be activated and funds made available so that operations can continue without financing-gap interruptions.

It is self-evident that the index and trigger have to correlate with GERFAE's expenditure and capital requirements for contingent funding to provide a sufficient "hedge" against GERFAE's expenditure risk; that is to effectively mitigate the risk of exhausting the capital available to GERFAE and therefore the cessation of critical emergency response and preparedness activities. Different sorts of underlying indices can be distinguished. In order to introduce the critical aspects and issues associated with defining an appropriate index, it is useful to present the two extremes of conceivable triggers to motivate the discussion: a trigger based on objective and independently verifiable parametric index versus using actual or estimated GERFAE expenditure as an underlying index to trigger contingency funds. Possible triggers and indices will be discussed subsequently in Annex 1. This discussion is most relevant in the context of risk transfer arrangements with the international risk markets, but should also be considered for other donor-based financing options.

Contingent grants from donors

Agreements could be arranged in which donors commit to provide contingent grants to GERFAE under specific triggering conditions. Contingent grants would be described by an ex ante agreement regarding the conditions under which an additional grant is due and its amount. Contingent grants are conceivable without determination of conditions before hand however, i.e. ad hoc grants where GERFAE would solicit additional funding from donors when its internal funds were on the verge of depletion after a serious disease outbreak(s). This unsystematic fund-raising during or after crisis situations is a predominant way international disaster aid is financed.[233] It can be interpreted as contingent grant financing since it depends on the occurrence of a crisis situation, although the contingency is not specified, formalized or secured in an ex ante manner. Preventing temporary insolvency of GERFAE cannot be guaranteed through relying solely on such unsystematic, ad hoc contingent grants and donations.

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[232] Doherty (2000), p414 – 416.

[233] See United Nations (2005) for an example of how these issues of funding are beginning to be tackled for humanitarian emergency aid.

The aim of being able to access additional funds is to ensure that capital is provided when it is needed to finance emergency measures in recipient countries. Therefore GERFAE has to have well-established channels to donors in order to ensure rapid capital provision in case of an emergency situation. In case of ex ante specified contingency agreements, proper triggers and payment procedures can prevent temporary incapability of action, although these must be carefully specified to ensure that contingent donations are granted in a timely manner. A discussion of possible triggers and the requirements associated with them is discussed in Annex 1. Establishing well-functioning structures between GERFAE and potential donors from the outset will also be necessary to ensure appropriate budgeting and capital allocation for donors to be able to perform their contingency financing function well. This approach aims to bring at least some form of security for GERFAE into the often unsystematic and unpredictable arena of donor emergency fund raising.

A comprehensive, systematic contingency grant program could completely avoid temporary financial deficits for the fund. Whenever GERFAE expenditures reach a critical level, a trigger could be activated and new capital provided. By assuring a volume of contingent grants for a budgetary period the program would also provide certainty regarding how much capital can be raised and what kind of emergency measures can be afforded in the period considered, which allows for efficient and optimal allocation of GERFAE capital. In contrast, ad hoc contingent grant financing bears uncertainty regarding funds available and therefore emergency measures that can be undertaken. The availability of guaranteed contingency grant arrangements could allow for a reduction in the fund’s working capital, promoting a more efficient use of the resources. A further advantage of being purely grant financed is that no additional claims to refinance loan-financed losses of the past would burden GERFAE’s budget (see section 6.8.5). This would increase the financial capability of the fund and would reduce the probability of structural deficits after bad, high-expenditure years. Additionally contingent grants from donors could most likely increase the total amount of donations compared to, say, a strategy to maximisation the initial capital of the fund, because they raise donors’ awareness of animal disease risk and of the need to fund emergency measures.

However there are some disadvantages. Under a contingent grant program there still may be a risk of structural deficits if not enough contingency funding can be secured to cover large-scale or numerous animal disease outbreaks that require emergency measures exceeding the sum of working capital and contingent grants. It could create little incentive for GERFAE to work efficiently if, for example, contingent grants are triggered by GERFAE expenditures. To mitigate this possibility, asymmetric information regarding the justification of expenses has to be reduced such as through an obligation for GERFAE to report regularly to donors about the necessity of operations financed and for GERFAE to follow an auditable and transparent operational process in order to make it easy for donors to provide capital when funds are needed. Unexpected delays in the provision of contingent capital could lead to GERFAE’s temporary incapability of action, although as mentioned above clear definition of payment procedures can help avoiding such situations.

However, all such arrangements imply that donors have to hold almost as much capital as could be claimed from contingency arrangements to ensure that they can service these agreements faithfully. As with holding large capital reserves within GERFAE, there are opportunity costs, with funds reserved in donors’ accounts instead of the GERFAE account, capital which could be put to more productive work on other donor projects. Pushing ex ante specified contingent grants, and indeed the success of such a strategy, mainly depends on the donors' risk management and willingness to make appropriate provisions on their side. The efficiency of donor capital allocations is not in the scope of GERFAE and it is unclear how willing or able the donor community could be to address such strict contingency grant requirements of GERFAE.

Contingent grants do not necessarily require independent triggers. Current practice of international aid funding shows that grants are provided without independent and objectively verifiable variables that indicate a need for the requested amount of additional capital. The WFP for example pre-finances worldwide operations through funds available in its Immediate Response Account (IRA). The IRA is a flexible resource facility that enables WFP to respond quickly to emergency situations, while appeals and formal donations forecasts are under preparation. The IRA is a revolving fund, i.e. is funded by reimbursing allocations made to a specific operation with directed multilateral contributions subsequently received for that same operation.[234] WFP's Board establishes a target level for the IRA for each financial period. The target level should be maintained by repayment of advances made for eligible operations or activities, and by annual replenishment contributions from donors. Donors are requested to replenish the IRA annually in order to return it to its target level in January of each year.

It is recommended that arranging contingent grant financing a priori should be pursued whenever possible so that reliance on ad hoc and uncertain donor grants and donations during or after an animal disease crisis can be reduced or eliminated altogether. Without securing additional funding from donor stakeholders GERFAE would not be a sustainable instrument to finance emergency response planning and emergency response measures in recipient countries.

Contingent loans from donors, international organizations or banks

Agreements could be secured in which donors, international organizations or banks commit to provide contingent loans under ex ante determined triggering conditions. Principal, interest and (re-) payment procedures would have to be negotiated and determined before hand and these agreements would be valid for a certain period of time to ensure that contingent capital provision is triggered when additional capital is needed and to limit unexpected delays in the provision of contingent capital which could lead to GERFAE's temporary incapability of action.

As far as contingency agreements with banks are considered, a guarantee of a relevant institution would be necessary to borrow on their securities. The bank's evaluation of the guarantee would limit the principal and determine the interest rate with respect to the prevailing interest level on financial markets. Securing and paying for financing from the capital markets for example, where actors by necessity follow sound capital allocation and risk management procedures, formalizes and strengthens the security and reliability of such arrangements. It is conceivable that contingent loans from donors could be agreed under more favourable conditions, particularly lower interest rates, as donors do not need to maximise profits and repayments could be charged against donations of future periods. However the amount of contingent capital from donors would probably be limited, since, as discussed above, a contingency agreement requires the holding of capital reserves to service the arrangements for which they are being paid. Donors may not be geared to provide this function, unlike a well-rated private sector institution.

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[234] WFP (2006)

A comprehensive contingency capital program could completely avoid temporary deficits for the fund. Whenever the fund is on the verge of depletion, a trigger could be activated and new capital provided. GERFAE would be able to assure a volume of contingent capital that corresponds to its ability to pay back loans and interest, avoiding temporary deficits completely. The program would also provide certainty regarding funds available and emergency measures affordable in the period considered and as with a contingent grant program it would allow for efficient allocation of capital at GERFAE's account.

In general it is assumed that contingent loan financing would not provide protection against structural deficits, which means that arrangements have to be made for the case when expenditures for the financing of appropriate emergency measures exceed the sum of working capital, contingent grants and contingent loans. In order to align capital provision and capital requirement, several contingency capital agreements with different triggers and/or multiple trigger agreements could be arranged. The design of the entire contingency capital program, particularly the trigger sequence and the amount of capital provision it activates, would play a decisive role for the alignment of capital availability, management and capital requirement. A trigger should activate when available capital is almost diminished, but enough capital should be left over that guarantees continuation of operations until contingent capital from loans arrives. Every subsequent contingent capital arrangement should fulfil these conditions, and hence take into account previous arrangements (see Annex 1).

However contingent loans in general do not require independent triggers. The reason is that unlike reinsurance payouts or contingent grants, GERFAE would not benefit from the provision of a contingent loan, since it is required to pay back the principal and the interest, unless very favourable conditions from donor lenders are secured. As the ability to pay back is limited, the total volume of contingency arrangements is limited too. After a sequence of periods with high expenses, GERFAE would have to spend a large share of its means to pay back principal and interest of the contingent loans it drew on which could undermine the financial stability of the fund.

Given the discussion above contingent loans could be arranged to finance emergency response measures necessary in periods with serious disease outbreaks, when GERFAE expenditures are higher than expected and working capital or other free sources of funding are unavailable. In theory such loans could be indexed to actual GERFAE capital outlays or other appropriate indices to ensure funds are triggered in a timely manner. Loans would have to be repaid with interest in the following periods. Hence the working capital of the fund would have to be increased to finance obligations from contingent loans taken in the past in future budgetary periods and this should be considered when arranging such financing provisions.

Risk transfer via insurance or ART

The final option to be discussed in this report is the possibility of securing contingency funding through reinsurance or other ART derivative or securitization products from the international risk market. GERFAE could buy protection to cover the risk of animal disease outbreaks and high GERFAE expenditures. In return for a premium, the risk taker would cover part of GERFAE's expenditure risk, establishing secured contingency funds when needed. The price for risk transfer via an insurance or derivative instrument depends on the risk taker's assessment of magnitudes and probabilities of potential compensation payments it is required to make, i.e. of the severity of animal disease risk covered under the negotiated contract. A payment is made only when the pre-specific trigger is activated by a pre-determined index, up to a maximum amount, which is the limit for the contract in the period covered. The more frequent the risk that is being covered the more expensive the premium charged. Hence it only makes sense to use such an instrument for more extreme levels of risk, where securing other forms of contingency funding at lower cost, such as contingency grants and loans, would be difficult and/or public sector funds may be stretched or depleted.

It is important and non-trivial to determine what is meant by animal disease risk in terms of such a contract. More so than the other contingent capital arrangements described above, an index and trigger has to be defined which reflects the severity of animal disease risk and triggers risk mitigating payments. Furthermore these parameters must be defined when negotiating a risk-transfer contract in such a way that they provide adequate protection for GERFAE yet also security and confidence for the risk taker. A discussion of trigger and index requirements for risk transfer to the international markets in the context of moral hazard and basis risk is given in Annex 1 and is not repeated here. However it is clear that risk transfer is only appropriate for emergency events least capable of being influenced by GERFAE, international institutions, national Veterinary Services and livestock holders in recipient countries. Furthermore the structure of such risk-transfer instruments could have proportional quota-share (co-insurance) features to further deter moral hazard and therefore encourage and attract more private sector counterparts.

Given the unknown nature of global animal disease risk, and the complications in monitoring and quantifying this risk, accessing the international risk markets is not straightforward. As discussed in Annex 1, the most realistic approach of engaging private sector risk takers such as reinsurers, hedge funds or investment banks is through education and by creating mutual trust between GERFAE and the risk industry. In particular this can be done through increasing transparency of GERFAE's operations and reporting procedures, as well as engaging independent, international animal diseases experts and investing in cutting-edge modelling and research initiatives to establish appropriate, objective and independent indices, triggers and a thorough GERFAE expenditure risk analysis. It also requires investments of risk-takers to studying animal disease risk, observing animal disease risk management and screening incentive compatibility of risk management principles on the level of GERFAE, national institutions and individual farmers.

Mutual trust can only be developed through long-term relationships. Therefore from the outset it is important for GERFAE to engage in such initiatives. It could start a pilot project with selected, interested risk takers for example, aimed at setting the stage for future possibilities to transfer GERFAE expenditure risk to insurance markets. One idea is to test this type of arrangements in limited pilots, such as covering animal disease risk only in countries with well-functioning Veterinary Services, i.e. with a certain PVS evaluation result, and adequate historical data for risk assessment. This would also be an opportunity to promote PVS evaluations to reinsurers, i.e. what kind of quality of a Veterinary Service they can expect in countries where they cover the costs of animal disease outbreaks. With time and success such pilots could evolve into more substantial longer-term commitments. With the development of appropriate indices and triggers, derivative-type instruments and a broader range of risk takers could become involved and a wider portfolio of risk management tools and strategies could be considered. Of course, these types of risk transfer solutions come at a cost, which would have to be covered by GERFAE, and ultimately the contributing donors.

Provided that risk transfer can be arranged, GERFAE would be able to continue financing emergency measures in periods with several serious animal disease outbreaks, when expenses exceed GERFAE's overall working capital and capability of fund raising. Risk transfer solutions, e.g. reinsurance, should be deployed for low-probability high-severity events. The reason is that risk transfer is costly,[235] unlike contingent loans. However a period with several large-scale disease outbreaks purely financed by contingent loans could result in a serious long-term capital-deficit situation for GERFAE. At a certain level of risk it may make sense to leverage capital within this fund through risk transfer to ensure financial viability in extreme cases. As in such cases donors themselves may find it difficult to cope with the required financial commitments, having supported GERAFE at more frequent levels of risk, sharing this risk with entities outside the public sector should therefore be considered.

6.6.4. Recommendations for GERFAE financial risk management

A risk financing approach to managing GERFAE expenditure risk within a given budgetary period is recommended. Firstly, the initial working capital of the fund has to be established through donor contributions that are sufficient to finance emergency preparedness expenses and emergency response measures under relatively certain capital outlay scenarios within the given period. Secondly, contingent grants from donors or other actors could be used to finance further emergency expenditures when needs are higher, so that GERFAE is a sustainable financing tool to support global animal disease risk management, but one that is to a certain extent self-sufficient from appealing for additional donor contributions in "normal" or "moderate" years. In periods with several outbreaks or significant large-scale outbreaks, which require further substantial emergency capital outlays, pre-arranged contingent loan agreements could be triggered to provide additional capital in order to ensure continuation of GERFAE's animal disease risk management operations. GERFAE should be principally able to pay back contingent loans in following periods.[236]

These funding instruments summarise GERFAE's initial capability of fund raising and they can and should be arranged in various quota share or excess-of-loss formations, in expenditure terms and in time, to attain an optimal balance of risk financing capability and opportunity/financing cost given the spectrum of risk GERFAE faces in a given risk period.[237] This is a challenging exercise in itself, but will need to be considered and developed as the fund evolves and begins to operate to allow for the most optimal and efficient financing structure. It is strongly recommended that such decisions are always made in the context of quantitative analysis of the underlying *global* GERFAE risk and a management decision as to what the overall capital reserves of GERFAE should be, to reflect the financial obligations it has made to recipient countries.

It is also strongly recommended that ex-ante contingent agreements should be arranged as opposed to negotiating ad hoc capital provision when capital is needed. This is for *timely* and *reliable* financing, with funds made available immediately under the specifications of a contingent agreement. The timing of funding is critical to the efficient response and deployment of emergency measures, and the security of sufficient funding when needed is a strong incentive for efficient and thorough contingency planning and emergency preparedness. Ex-ante negotiations save time and budgetary surprises in moments when time and money is most scarce and offer security to enable efficient financial planning and capital allocation.

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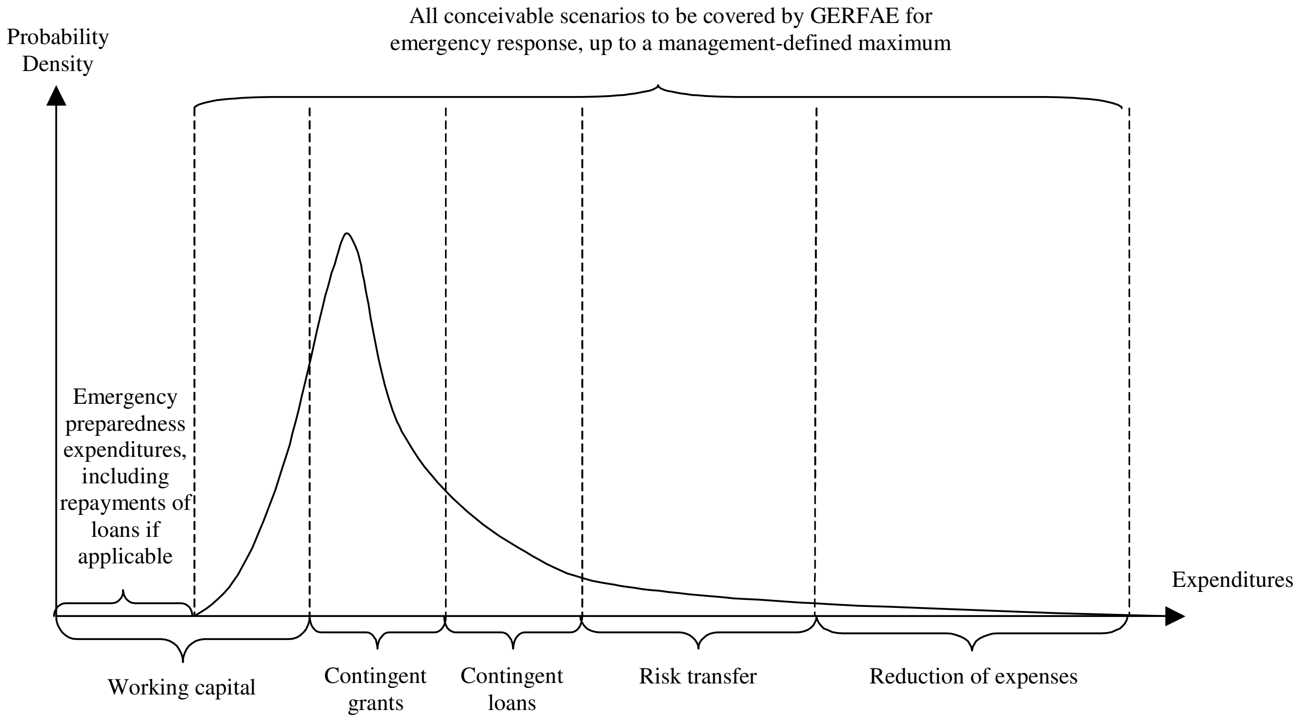
[235] Hess (2006), p10

[236] For examples considering the roles of various financing instruments in a comprehensive risk financing strategy see Hess (2006), and Gurenko and Mahul (2006)

[237] For an example of how resources can be mobilized through time see Ghesquiere and Mahul (2007)

Of course, an element of flexibility should also remain in these arrangements as understanding and quantifying potential global animal disease risk exposure and hence GERFAE expenditure risk is scientifically and technically challenging and will always be subject to uncertainty and modelling error. GERFAE should, however, be able to continue its operations in situations that require more funding. As the majority of the funding sources outlined above are public sector driven it is recommended that GERFAE also targets developing access to the international risk markets to relieve the burden of animal disease risk financing from donor budgets. Financing instruments such as those described in Annex 1 could and should be developed in the future with the aim to enable access for GERFAE to risk transfer tools and the risk capacity of the international reinsurance and capital markets, for example through insurance, derivative contracts or other risk transfer solutions such as risk smoothing structures or finite financing arrangements.

Figure 3: Simple illustration of potential GERFAE financial risk management structure


Probability Density
All conceivable scenarios to be covered by GERFAE for emergency response, up to a management-defined maximum
Emergency preparedness expenditures, including repayments of loans if applicable
Expenditures
Working capital
Contingent grants
Contingent loans
Risk transfer
Reduction of expenses

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Annex 1: Towards indexing GERFAE expenditure risk

For the risk management of GERFAE, special attention has to be devoted to the mechanism that activates contingent funds and if necessary the amount of funds made available. This mechanism requires a variable, known as index, and the determination of a certain value of that variable, known as a trigger. The specified index can be monitored throughout a budgetary period, and as soon as it reaches its pre-determined trigger value, contingent funding can be activated and funds made available so that operations can continue without financing-gap interruptions. In order to introduce the critical aspects and issues associated with defining an appropriate index, it is useful to present the two extremes of conceivable triggers to motivate the discussion: a trigger based on objective and independently verifiable parametric index versus using estimated or actual GERFAE expenditure as an underlying index to trigger contingency funds. This discussion is most relevant in the context of risk transfer arrangements with the international risk markets, but should also be considered for other donor-based financing options.

Selecting a trigger and index

The appropriateness of a trigger and index depends on the discussion and analysis of basis risk and moral hazard.[238] Basis risk denotes the potential mismatch between contingent funds and GERFAE's needs for additional capital. The higher the level of basis risk, the less perfect the correlation between the index and GERFAE's expenditure is.

An underlying index to trigger contingency funds can involve moral hazard when there is no or little independency between the index itself and the activities of the beneficiaries of the contingent funds. Consider the hypothetical situation where the GERFAE performs poorly in managing animal disease outbreaks, e.g. forgoing proper control and precise support of animal disease risk management or monitoring of compensation values in recipient countries, resulting in prolonged and more expensive interventions. If the index and trigger for additional funding was actual GERFAE expenditures, the index would increase as outbreaks became more serious and expensive. Ultimately GERFAE could benefit from its own poor performance through the flow of contingent funds, even if no malicious intent or unethical behaviour was behind GERFAE's poor performance leading to the triggering of additional funds. Thus there is an obvious conflict of interest and incentive problem when using such an underlying index. Providers of contingent capital anticipating inefficient behaviour would increase the price of contingent capital or most likely withdraw or restrict access to such contingent funds completely. Whenever the behaviour of the beneficiary of contingent capital influences the index and the possibility of triggering funds, moral hazard persists that may complicate the arrangement, increase the price or limit the availability of contingent financing agreements.

A perfect index is free from basis risk and moral hazard. In the following, possible indices and triggers are presented and analysed in the context of animal disease risk with reference to basis risk and moral hazard.

Underlying parametric triggers and indices

Events that may activate the flow of contingent funds can often be described by objective and independently verifiable parameters that describe the risk in question; these parameters can then be used as an underlying index to trigger funds from various financing arrangements. To illustrate this concept consider the parameters that are regularly used in the international (re)insurance and financial markets to provide index-based or parametric (re)insurance or risk management solutions for institutions and companies exposed to earthquake, hurricane or weather risk for example. The severity of such events can be represented by indices such as the intensity of an earthquake on the Richter scale and the location of its epicentre, the wind speed, category and/or position of a hurricane, or the temperature or rainfall amount recorded at a reference weather station. These indices and their values can then be attributed or correlated to the financial exposure of an institution or company seeking to manage the specific financial risk associated with them.

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[238] Shaik, et al. (2006) and Meuwissen et al. (2006)

Consider the following simple example. By using its portfolio data from previous years and historical wind speed data from a reference weather station(s) provided by the National Weather Service, a car insurance company with a large portfolio of comprehensive covers in a certain city can perform an analysis between the wind speeds of past windstorms in the city in question and the actual car insurance claims they subsequently received as a result of the storms. The analysis can be used to determine the relationship between maximum wind speed on any given day and claims the insurer expects to receive as a result. If a good relationship is found between strong winds and claims, a wind speed index could be developed as an underlying variable for index-based reinsurance coverage, which would trigger funds to the insurer to assist in the settlement of the expected excess claims if the wind-speed index exceeds a pre-determined trigger level during a specified period. In other words the index is designed to be a proxy that correlates well with the actual car insurance claims the company would expect to receive in the event of a windstorm.

In general such parametric triggers are objective and independently verifiable and are therefore free from moral hazard since no one can influence these observable parameters, such as the strength and locations of severe windstorms as reported by National Weather Services, or the occurrence of such events, particularly extreme and catastrophic events, in the first place. However simple parametric triggers and indices often involve basis risk: for example the actual losses of the car insurer in the illustrative example above may be very different if a 125 km/h maximum wind speed storm happens during day or night, because at night not as many cars are at risk because some are kept and protected in garages.

Of course, it is possible to define an index and trigger as a function of several objective underlying parameters, for example wind speed, time of the day, duration and wind direction in the example above, to reduce basis risk. An advanced approach is to model the consequences of catastrophic events, using even more complex relationships to determine output risk measures from objective input parameters; this approach is usually used for earthquake and hurricane risk transfer solutions in the international parametric reinsurance and catastrophe bond market.[239] Technical and objective parameters describing the event are used as input variables – such as the time, strength and track of a hurricane – and a model explicitly takes into account the expected consequences and financial impact of the event, e.g. the resulting property and casualty losses of an insurance company selling insurance to residents in a specific area, such as a zip-code in Florida. Sophisticated model-derived indices and triggers such as this can greatly reduce basis risk of the subsequent amount of triggered contingent funds. Specialized, independent firms are usually hired to model such complex risk[240] and as these models and their inputs are specified at the outset and solely objective, independently verifiable parameters are used to determine the model output, i.e. the index, they are free of moral hazard.

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[239] RMS (2005)

[240] Examples of such companies include AIR Worldwide Corporation and Risk Management Solutions (RMS) amongst others.

A recent example of where an objective index was used to secure contingent funding is World Food Programme's (WFP) Ethiopia Drought Insurance Pilot Project. The WFP pilot used a weather derivative to demonstrate the feasibility of establishing contingency funding for an effective aid response in the event of contractually specified severe and catastrophic shortfalls in precipitation during the 2006 agricultural season.[241] The underlying index of the weather derivative – known as the Ethiopia Drought Index (EDI), on which payments would be triggered through WFP's weather derivative contract with Paris-based reinsurance company AXA Re – was based on rainfall data taken from 26 of the best weather stations distributed throughout the agricultural areas of Ethiopia. WFP showed there is a strong correlation between drought in Ethiopia and subsequent expenditure of the WFP and its donors to provide Ethiopian people with emergency food aid and assistance due to drought-related agricultural production shortfalls. By using 50-years of historical rainfall data from the 26 stations the EDI was constructed for each Ethiopian agricultural season from 1956-2005 and for 2006 as the daily data was recorded and reported. The historical EDI shows an 80 percent correlation with the total number of historical food aid beneficiaries from 1994 to 2004, but more critically it picks up the well documented catastrophic drought events that have occurred in the past 50 years, specifically 1965, 1984 and 2002, which the index was designed to capture. Hence the EDI used by the WFP team showed limited basis risk and was free from moral hazard since the rainfall data from the 26 weather stations could not be influenced by WFP and was monitored by an external third party company for quality and integrity throughout the life of the weather derivative contract in 2006.

However in the context of animal disease risk and GERFAE expenditure risk, purely objective and independently verifiable parameters are not available as in the case outlined above for Ethiopian drought. Variables describing the occurrence or the consequences of an outbreak always depend on the performance of GERFAE, authorities in recipient countries and/or farmers in disease prevention and control. However certain information does exist and/or has the potential of being collected at national levels[242] and there is also potential to use epidemiological and simulation models to estimate the financial risk to GERFAE given certain operational and response implementation assumptions. From such considerations possible objective indices and trigger mechanisms may exist to enable access to index-based contingency funding arrangements which have significant controls on moral hazard without introducing an unacceptable amount of basis risk (see discussion below).

GERFAE expenditures

Simply using GERFAE expenditures for total emergency preparedness and response in a given time frame as an underlying index to trigger additional funds is an extreme alternative to the parametric approach outlined above. It would involve little basis risk, assuming any outstanding concerns regarding the timing and magnitude of available contingent funds would be addressed, but as discussed above the approach is open to potential moral hazard. Contingent financing arrangements with GERFAE expenses as an underlying index would have a contractual structure similar to traditional reinsurance coverage used by insurers, which bases risk mitigating compensation payments on actual losses incurred (claims) as reported by the insurance company.

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[241] For details of pilot see WFP (2005)

[242] Meuwissen et al. (2006)

If GERFAE's actual expenditures were used an underlying index to trigger contingent funds, instruments and strategies to reduce the possibility of moral hazard would have to be applied in order to convince providers to make contingent capital available. For example additional trust and assurances could be created between GERFAE and the provider of contingent capital through transparency of operational activities and expenditures; proof of compliance with developed contingency plans and eligibility criteria; monitoring of operations and expenditures, financed with contingent capital to reduce informational asymmetries; structure of the contingency funding agreement(s) to have quota sharing (co-financing) arrangements and larger retention levels to deter moral hazard, over or in addition to excess-of-loss structures for example. It should be noted that using GERFAE's actual expenditures as the underlying index for contingent financing agreements is more likely be possible with grant-providing donors than with commercial private sector risk-taking, entities who would be uncomfortable with such unfamiliar risk, such an unconventional counter party and arrangement and the potential for moral hazard.[243] Current practice of international aid funding shows that grants are provided without independent and objectively verifiable variables that indicate a need for additional capital.

Possible GERFAE triggers and indices

As discussed above, objective and independently verifiable technical parameters that describe animal disease risk are in general not available, but it is worth rethinking possible variables that could be used or investigated further to enable access to index-, and potentially market-based, contingency funding arrangements which have significant controls on moral hazard without introducing an unacceptable amount of basis risk.

There are several underlying indicators that are discussed in the literature, other than expenditure-based indices, that could be used to form a country-level or regional index to capture and estimate the financial impact of a given disease outbreak, particularly for a *global* fund such as GERFAE which will have some capacity within its working capital to absorb basis risk events. Potential indicators could include, individually, in combination or in relation to, but not exclusively, the following:[244]

- Country-level or outbreak-specific animal mortality rates;
- Number of animals infected with a particular disease in a given timeframe;
- The number of culled or vaccinated animals in response to an outbreak;
- Duration of the epidemic outbreak;
- Declaration of an outbreak or associated trade restrictions;
- Human mortality rates due to a specific zoonotic disease outbreak.

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[243] These are also the reasons cited for the lack of traditional reinsurance capacity for livestock in current market, see Part III.

[244] Green et al. (2006) and Meuwissen et al. (2006)

These indicators, which would have to be defined per country or region and disease, have varying degrees of moral hazard potential, which will be discussed below, particularly as specific control strategies and measures can influence their value. However, if control strategies are defined as part of the pre-requisite country-specific emergency contingency plans for GERFAE funding eligibility and if monitoring of these indicators is performed by several independent parties using pre-agreed, best practice monitoring and reporting methodologies with cross-check mechanisms, there is potential to use this information in some way to help manage and monitor GERFAE expenditure risk, if not access contingent capital. Furthermore, the definition of contingency plans implies the operational GERFAE costs associated with a certain epidemic duration or number of animals culled or vaccinated in an area for example is known before the event occurs, therefore the financial risk associated with varying levels of these indicators, and thus the contingent capital required in the case of extreme events, can be estimated and quantified. Finally, if some or all of these indicators are aggregated to the ultimate global GERFAE level, i.e. into a GERFAE-specific expenditure index, the ability to influence such an index from the country-level may be somewhat limited, restricting the opportunities for deliberate moral hazard. Taking a global approach will also encourage a global perspective to the risk management of GERFAE, maximizing the potential risk pooling effects gained from considering all diseases risks together for the purpose of capital allocation and fund management.

As a significant share of GERFAE’s total expenditures for emergency response measures would be compensation payments, the number of animals of a certain species infected with or dead from a certain disease within the period considered could serve as an underlying index, involving relatively little basis risk as a GERFAE expenditure indicator. As mentioned above compensation values would probably differ between regions, such a variable would have to be defined for each region characterised by different animal compensation values. Records of dead animals due to animal disease outbreaks could be arranged, e.g. through compensation payment data from GERFAE to national compensation schemes. However there is severe moral hazard potential. The institutions involved in animal disease risk management determine the number of dead animals due to disease outbreaks, since they administer vaccinations and execute slaughters. That means they directly determine the index and indeed many of the indicators outlined above. The more comprehensively they carry out disease eradication, the more likely it is that the organisations would be provided with contingent funding via an index-based mechanism particularly if such an index was solely based on country-specific data. Nevertheless several structures and procedures could be set in place as part of GERFAE’s operational activities to ensure that opportunities for moral hazard can be reduced and controlled to a certain extent.

This approach has been taken by the World Bank in Mongolia[245] where livestock mortality data collected through the annual government animal census is used to determine a livestock mortality index value and potentially trigger a contingent credit line from the World Bank to the Government of Mongolia to address extreme mortality losses. It should also be noted that a similar approach has been used in a recent market securitization of extreme human mortality risk, arranged and issued by Swiss Re who obtained US$ 362 million of mortality risk coverage through their Vita Capital II programme[246], reportedly partly in response to growing fears of a potential human influenza pandemic. The underlying catastrophe bond will be triggered if there is an abrupt jump in a human mortality index developed using reported data from several institutions over the period 2006-2010. The structure of the Vita Capital II risk coverage is based on a combined mortality index, which applies predetermined weights to the annual general population mortality in the United States, United Kingdom, Germany, Japan and Canada. The principal of the Vita Capital II notes begins to be at risk if, during a measurement period of any two consecutive years within the risk coverage period, the combined mortality index exceeds predefined percentages of the expected mortality level. The concept cannot be easily transferred to the animal health context however due to the issues of moral hazard mentioned above, as in this example the records for human mortality are taken from institutions which are not involved in the financial arrangement transferring human mortality risk to the capital market and the counterparties involved have no possibility of influencing the index and such an extreme event.

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[245] Mahul and Skees (2006)

[246] See for details: http://www.swissre.com/Internet/pwswpspr.nsf/fmBookMarkFrameSet?ReadForm&BM=../vwAllbyIDKeyLu/gdso-6bdjyb?OpenDocument

Another indexing approach is to use the event of an outbreak of a certain disease in a certain region within a given timeframe itself as a trigger for a pre-specified amount of contingent funding. Such a trigger would assume the value of zero if there was no outbreak or the pre-specified amount of contingent funding made available to GERFAE if an outbreak occurred in the defined period. As with the indicators above this is not an independent variable, since the probability of the occurrence of an outbreak depends on the performance of international institutions, authorities in recipient countries and/or farmers in disease prevention. One could assume that it is in the interest of Veterinary Services and other relevant organisations that outbreaks do not occur at all, hence controlling moral hazard, but it could involve significant basis risk as quantifying the amount of funding required is difficult. Outbreaks can imply significant or negligible GERFAE expenses, depending on how rapidly the disease can be contained and eradicated. However through the application of various epidemiological and simulation models to estimate the financial risk to GERFAE given certain operational and response implementation assumptions in the event of an outbreak, guided by the emergency preparedness and contingency plans, could determine an average amount that should be triggered if pre-specified outbreak events happen.

A third idea is to use decisions from institutions outside national Veterinary Services as an objective trigger for additional funding, e.g. the declaration of import restrictions. Contingency financing could be activated when one or several countries ban the import of animals or animal products of a certain species from a certain region or nation. As the institutions ruling the import ban do not benefit from contingent funds, such a trigger would be free from many of the aspects of moral hazard potential discussed above. The implementation of import bans would only be partially correlated with GERFAE expenditures however, which would introduce significant basis risk into this mechanism.

The analysis of alternative approaches shows that it is complicated to find an underlying index, indices or triggers that involve little moral hazard opportunity but that are highly correlated with GERFAE expenditures. The approaches mentioned can be combined and calibrated to optimise the trade-off between basis risk and moral hazard, as shortly described in the comments on designing and modelling indices below. As risk transfer is principally a sound strategy to cope with variable GERFAE expenditure risk, and that the possibilities of risk transfer ultimately depend on the finding of an appropriate index that potential risk takers, particularly within the private sector, will accept, it is worthwhile to discuss and outline the prerequisites necessary for the development of potential indices and triggers.

Towards indexing GERFAE expenditure risk

In order to implement a successful index-based risk management program, the data used to construct the underlying index or indices must adhere to strict quality requirements to facilitate: a) confident use of the index as a reliable indicator on which to make risk management and financing decisions for both

GERFAE fund managers and contributing donors; and b) potential risk-transfer opportunities to the international risk markets. These include[247]:

1. Reliable and trustworthy on-going regular collection and reporting procedures;
2. Regular quality control and monitoring of data reported;
3. An independent source of data for verification, e.g., an independent third-party observer or several independent sources collecting the same information;
4. A long, quality-controlled, and internally consistent historical record to allow for a proper actuarial analysis of the risks involved.

Given the discussion above of possible GERFAE indices and triggers, it is clear that few if any of the suggested indicators satisfy these ideal criteria, in particular to a level necessary to attain objective b) – risk transfer to the international risk markets – which requires a strict interpretation of the listed conditions. However potential does exist to strengthen or introduce new measures within each GERFAE recipient countries' emergency preparedness activities and planned emergency response measures to ensure that data before, during and after a potential disease outbreak within the country is collected in a manner that satisfies the quality and independency requirements of the first three points. As suggested in the section above: establishing baseline data for livestock holdings in each country; using international best practices for data collection and reporting procedures with a checks and balances system; arranging for international independent third-party observers to check and quality control this data and procedures where possible; closely monitoring outbreak control and eradication operations and expenditures; establishing co-financing arrangements with recipient governments for response measures; and pooling risks from disparate regions and diseases to limit the possibility of data from a particular country or organization influencing the index, are possible mechanisms that could be easily established as a standard part of GERFAE's operations and response mechanisms. Over time the systematic application of these data collection procedures would produce a rich historical record of animal disease risk information in a given country or region eligible for GERFAE funds and may achieve some minimal level of adequacy and trust in index construction to entertain the concept of risk transfer using market-based mechanisms.

In fact, one of the greatest impediments to accessing and securing risk transfer to the international risk markets is precisely this lack of existing historical data regarding animal disease risk and the associated uncertainty regarding the frequency of outbreaks, the probability distribution describing the spread of livestock disease epidemics when they occur and the losses expected. Indeed this uncertainty has been attributed as the major cause for the lack of reinsurance capacity within the private sector for epidemic livestock disease risk. The premiums associated with risk management strategies involving risk transfer are based on a sound actuarial analysis of the underlying risk. An appropriate premium given the probability and severity of specific risk events will be charged by a commercial risk-taker, hence the quality of historical, as well as on-going, data is paramount.

It is clear that since animal disease losses occur irregularly and often infrequently in time and place and as historical data of past disease outbreaks – if such events have ever occurred – particularly in developing and transitional countries, if any exists, is poor or incomplete, assessing the underlying risk for GERFAE is significantly demanding. The additional complicating factors regarding livestock diseases characteristics – for example the spread of many diseases, such as FMD, is not only difficult to ascertain from a scientific and epidemiological standpoint, but can depend highly on the control strategy applied and therefore the particular environment, the farm and herd intensity and marketing structure, of the outbreak location as well as the critical behaviour of actors involved when an outbreak occurs – pose serious challenges.

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[247] World Bank (2006)

However, if market-based mechanisms for risk transfer are to be ultimately used as a complementary risk management tool for instruments such as GERFAE, these challenges regarding the lack of adequate historical data and understanding of the underlying risk for premium rate making need to be addressed. As proposed by Meuwissen et al.[248] in the context of commercial epidemic livestock insurance, the use of the expertise and knowledge of those working in the epidemic animal disease risk arena can complement any existing data to inform the rate making methodology. Furthermore, epidemiological models can be used to provide information for parameters describing the spread of diseases and potential magnitude of disease losses; and models exist that can be used to investigate the impact of spatial, dynamic and stochastic model stimulates, given a specific control strategy or strategies.

The elicitation of subjective expert knowledge, from local and international research institutions, can provide GERFAE with the quantitative information necessary for modelling purposes. Expert opinion for example can advise as to the expected frequency of diseases in a particular country or national sub-region, given animal and farm densities and geographical characteristics and the control measures appropriate for each situation under consideration.[249] A discussion of the appropriate control measures will be necessary nonetheless when drawing up appropriate emergency contingency plans as part of each country's preparedness strategy. Coupling these epidemiological models with Monte Carlo simulation methodologies for example is an adaptable approach to investigating aspects of livestock disease outbreaks that are stochastic in nature and to gain an insight into the probability distribution of the various parameters that can describe an outbreak, such as the duration of an epidemic or the estimated magnitude of direct GERFAE expenditures generated through the pre-established compensation schemes and response measures. As suggested by Meuwissen et al. (2006) stochastic variants can be incorporated into epidemiological models by using probability distributions derived from expert consensus and opinion that can then be introduced as model input modifications.[250] Each simulation would randomly draw numbers from these specified distributions, representing a possible combination of parameters that could occur for a particular disease outbreak in a specific country. Combining these results of all simulations will lead to a distribution of output values for various disease outbreak indicators, such as mortality rates or the number of vaccinated animals, which could then be converted into direct livestock epidemics losses for GERFAE within a given country, a region and ultimately for the entire GERFAE portfolio.

It should be stressed that using such a modelling approach guided by expert opinions is not straightforward and poses significant technical and methodological challenges. Furthermore this approach may not be appropriate for detailed and accurate farm-level loss analysis but might be more appropriate for general, aggregate statistics and estimates of an outbreak, such as the number of farms infected or the duration of an epidemic[251] which could be used as the underlying indices from which the expected probability distribution of GERFAE expenditures could be estimated. This aggregated approach makes sense in the context of GERFAE, a global fund which will have some capacity within its working capital to absorb animal disease risk, but will be concerned with large-scale destabilising events that can impact its overall portfolio and financial solvency. Furthermore, technical uncertainties, assumption errors and remaining exogenous factors, such as actor behaviour during an outbreak event which are difficult to predict and model – disadvantages of this approach leading to potentially significant basis risk – could be more easily managed by taking a aggregate view, as GERFAE could also absorb a certain amount of basis risk within its operations if it took a portfolio over a country-specific approach to risk management and capital allocation.

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[248] Meuwissen et al. (2006)

[249] Ibid

[250] Meuwissen et al. (2006)

[251] Ibid

This modelling approach to handling events and risks that occur infrequently in time and place and where limited historical data exists is not a unique solution for animal disease risk, but is commonly used within the hurricane and earthquake reinsurance and risk transfer markets. Many reinsurance, derivative and securitization contracts and their associated premiums are based on the output of sophisticated models estimating losses due to specified events, as described in this Annex, which are continually being refined and improved.[252] It is therefore recommended that GERFAE should make headway in understanding and modelling its underlying animal disease risk and focus efforts and innovation on pushing the necessary research and data collection techniques required to develop this field.

To summarize, the challenges of indexing GERFAE expenditure risk during a given time frame to objective and independently verifiable parameters will be significant, however steps can be taken to ensure that the data collected documenting indicators which would become underlying country and disease specific indices, could be introduced. Furthermore, these real-time indices could be linked to ex-ante expert epidemiological modelling and simulations to understand their probability distribution over a given timeframe. The methodological technology potentially exists and should be developed to elicit the underlying distribution of GERFAE expenditure risk. Not only will this enable model-derived rate making information to be generated in the future for potential risk transfer opportunities, but it will also improve the capital allocation and risk management decisions of GERFAE as discussed earlier. Such modelling approaches can be used to establish appropriate triggers for management decisions and funding flows that could be contingent on real-time indices as they are reported and collected for a particular event or events.

Ultimately, pooling these risk indices from the disparate regions and diseases within the GERFAE portfolio is the optimal approach to limit the possibility of data from a particular country or organization influencing an aggregated index. In this way opportunities for moral hazard can be reduced and controlled to a certain extent and the potential beneficial risk pooling effects gained from considering all diseases risks together for the purpose of capital allocation and fund management can be used. The development of such a total GERFAE expenditure index, composed of underlying expenditure indices for specific eligible country, disease risks and attributed emergency response measures, should be the objective of GERFAE managers. However, this will be a slow process and much research, work, innovation and piloting needs to be developed before such techniques can be applied and used with confidence and reasonable assurance of accuracy.

The realistic process will be a step-by-step approach, taking a country or disease one at a time, establishing the appropriate data collection procedures and modelling efforts. This must be then followed by engaging and interacting with relevant private and public sector stakeholders to educate and build trust within the system through transparency in risk monitoring, analysis methodology and GERFAE operation. Taking such as approach may potentially open the doors to market-based risk transfer opportunities in the future and crowd-in the private sector to develop a new and sustainable market for animal disease risk.

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[252] E.g. following Hurricane Katrina, RMS (2005)

Annex 2: The characteristics of epidemic livestock disease risk

The financing of risk costs is usually not a task of public institutions, be it at the national or global level. Regarding animal disease risk however, this is different. Arrangements for the financing of costs and losses of disease outbreaks strongly influence risk management activities undertaken by stakeholders, which again determine the severity of animal disease risk. Hence the set-up of the animal disease risk financing system is a key element of developing a global animal health policy aiming at efficiently managing animal disease risk. To do this, the interdependencies between stakeholders' activities and animal disease risk have to be fully understood.

Interference of animal disease risk

From a financing point of view, risk is a stochastic variable. Each stochastic variable has a distribution, which determines the values the variable may assume and the associated probabilities. A key characteristic of animal disease risk is the strong dependency of risk distribution from stakeholders' animal disease risk management activities. Individual farmers can keep their animals separated from other animals and thus reduce their probability of infection. Also national governments influence animal disease risk. If they decide to establish or improve the Veterinary Services throughout a country, which carries out regular controls of herds, disease outbreaks could be noted and contained earlier. This measure would therefore reduce the probability of large-scale disease outbreaks in the country. In many developing and transition countries, multilateral or bilateral donors finance or directly provide technical assistance to national Veterinary Authorities in disease control and eradication. In these cases, the total costs and losses of a disease outbreak are not only caused by the response of the national authorities, but are also influenced by the effectiveness of the technical assistance provided by international donors.

Externalities of animal disease risk management

As has been pointed out, animal disease risk is not purely stochastic; it is determined by the behaviour of stakeholders to some extent. This is not necessarily a problem. There is some sort of interference for most of the risks we know. And it is not an argument for public intervention: If the individual farmer can influence disease risk of his herd, he will undertake efficient risk management in order to minimise animal disease losses, while taking into account the costs of risk management measures. The same argument applies to other stakeholders if we assume that they pay for the measures they undertake and bear the costs and losses of disease outbreaks. This picture does not grasp the extent of interference however. The reason is that risk management activities are associated with externalities: When individual livestock farmers decide about implementing prevention and control measures, they mainly take into account costs and benefits accruing directly to them. They do not necessarily consider costs and benefits accruing to third parties. For example, individual animal producers have a significant influence on the overall costs of a disease outbreak originating on their premises, since their decision to early report the disease to the authorities could make the difference between a local and immediately contained disease outbreak and a global animal health crisis.[253] Similarly, risk management undertaken by institutions of a given country, e.g. the Veterinary Services, the police, agricultural and health ministries, farmers' and traders' associations, do not only affect animal disease risk of this country. Their performance in containing outbreaks may determine whether the disease spreads to other countries or not, disrupts trade or even leads to a global pandemic. An economic consequence of these externalities is that animal disease risk management decisions are not efficient when based on costs and benefits of the decision maker, be it an individual farmer or the government of a specific country. It is therefore important to analyse cost and benefits of animal disease risk management from a global perspective and to decide which measures should be undertaken at an international level, and which at other levels, to ensure that all benefits are taken into account.

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[253] See Gramig et al (2006), p44 for the correlation between total costs of animal disease outbreaks and the duration of disease outbreaks, which strongly depend on the effectiveness and rapidity of control measures.

Complementary relation between individual and public risk management

Understanding the importance and consequences of stakeholders' risk management activities is a precondition to the development of animal health policy strategies. One has to be aware of the complementary relation between individual and public risk management, too. That means efficient risk management comprises of efficient measures at the individual as well as at the public level. Deficits in individual risk management cannot be compensated through intensifying public risk management and vice versa. This is most obvious regarding ex-post risk management, following disease outbreaks. Early disclosure of disease outbreaks to the Veterinary Service in charge is an indispensable individual risk management measure. Even the best-equipped Veterinary Service could not check every herd for disease symptoms on a daily basis. Early disclosure therefore requires individual risk management activities, i.e. an alerted farmer who controls his animals' health status and reports disease symptoms immediately if necessary (see also section 6.3).

Once the outbreak is confirmed, emergency measures have to be carried out. Establishing restrictions, carrying out emergency slaughters and other emergency measures are public tasks. Individuals do not have knowledge, decision-making power and resources needed to perform these disease control measures. However risk-reducing behaviour of individuals is still important when disease control measures are implemented after the outbreak has been confirmed. The reason is that compliance with emergency restrictions cannot be enforced completely; the cooperation of individual farmers is necessary to ensure compliance with restrictions.

Cumulative nature of animal disease risk

Animal disease risk is an accumulation risk (see Part III). The reason is that once an outbreak occurs, the disease can spread to other animals through infection. Accumulation is a typical feature of catastrophe risk. Despite a large number of individual risks, e.g. animals or herds, there are no pooling effects when individual risks are aggregated in a portfolio of risks, i.e. costs and losses of the risk portfolio would be highly volatile. That means the probability is high that global animal disease risk realisation is moderate compared to what could happen in a worst-case scenario. However there is a small probability that the realisation of animal disease risk is catastrophic, i.e. that numerous large-scale disease outbreaks or even global animal disease crises happen.

Implications of the characteristics of epidemic livestock disease risk

Epidemic livestock disease risk has two main characteristics; both of them have far-reaching consequences for risk financing. Firstly, there is a strong interference of stakeholders' behaviour and risk, which causes externalities of risk management. In order to induce efficient animal disease risk management, a system for financing costs and losses of epidemic livestock diseases has to provide incentives for individuals and national institutions to enhance risk management.[254] The second key characteristic is the cumulative nature of animal disease risk. This complicates the subject of financing costs and losses of epidemic livestock disease outbreaks, since the need for funds is highly volatile. A system for financing costs and losses of epidemic livestock diseases should provide a mechanism to cope with this problem.[255]

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[254] This issue is further discussed in sections 6.3 and 6.4

[255] Relevant strategies are analysed in section 6.8 and Annex 1

Annex 3: Glossary

Ad-hoc grants: Ad-hoc grants, contrarily to ex-ante contingent agreements, are grants which have not been negotiated prior to an outbreak or other emergency, and that are given according to necessity.

Alternative risk transfer: Alternative risk transfer comprises instruments enabling the transfer of risk on capital markets and the financing of risk through capital markets, other than reinsurance and traditional insurance, which provide risk transfer and financing on insurance markets. Such instruments include catastrophic-loss (CAT) index-based derivatives or securitizations, which secure losses from catastrophic events such as hurricanes and earthquakes.

Basis risk: Basis risk is the risk of an imperfect hedge, which means that the payments associated with a hedging instrument do not perfectly compensate the risk that was supposed to be hedged. Hedging instruments can be commodity futures contracts to hedge price risks for example, or CAT Bonds to hedge the risk of losses from catastrophes.

Earmarked (national) contingency funds: The term earmarking refers to funds or capital specifically planned for a particular purpose. Earmarked national contingency funds are funds that are set aside by a national government body in the case of eventual emergencies.

Ex-ante contingent agreements: Ex-ante contingent agreements refer to agreements specifying the terms and conditions for the provision of funds before fund-requiring emergencies occur, as opposed to negotiating agreements once disasters have happened.

Expenditure risk: Expenditure risk is the risk regarding the sum of all payments in a certain period.

Global public goods: Public goods are characterised through non-rivalry and non-exclusiveness of their consumption. Thus public goods per definition involve public benefits. They are goods that are in the public domain — goods that are there for all to consume, either because they cannot be excludable, they are made public by design, or they are public by default. Global public goods are public goods that have a fairly universal impact, on a large number of countries, on a large number of people, or on a large number of generations.[256]

Index: The mechanism that activates contingent funds requires a variable, called the index, and a determination of a value for the index, called the trigger. Further explanations on the selection of a trigger and an index can be found in Annex 1 of Part II of this report. An aggregated index is an index derived from a combination of factors. An expenditure index is an index of payments to be made.

Monte-Carlo Simulation methodologies: The Monte-Carlo simulation methodology, also known as stochastic simulation, is a method used to evaluate an entity's exposure to risk. It allows an assessment of risk, despite uncertainty about several factors determining risk, and can take into account correlations between these risk factors. It involves replacing single entries with probability distributions of possible values for key inputs.[257]

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[256] The Global Network on Global Public Goods, UNDP (2005) http://www.sdnp.undp.org/gpgn/

[257] The Green Book, HM Treasury (2003) http://greenbook.treasury.gov.uk/annex04.htm

Real-time index: “Real-time” refers to a current value as opposed to historical data. Real-time indices refer to information that is collected following a particular event or a set of events, and will be used for management decisions.

Reinsurance: Reinsurance is the insurance of insurance companies. It is a way for the insurance company to transfer a part of the financial risks associated with insurance to another company. Reinsurance is a way of insurers to accessing additional capital, allowing efficient transfer of risk and expansion of risk acceptance capacity beyond the scale which would be allowed by the internal capitalisation and reserve accumulation of the insurer.

Risk mitigating: Risk mitigating refers to actions taken to diminish the risks. A number of approaches can be taken to mitigate risks, for example risk management, early consultation, etc.

Risk transfer solutions: Risk transfer solutions are solutions put in place to transfer the risk to another party. For example, in the insurance field, the term “risk transfer” can refer to transferring part of the known risk to the reinsurance sector.

Risk: Risk refers to the possibility of the economic consequences of loss events. Risk is unambiguously characterised by the overall economic consequences, i.e. losses, possible loss events, and the probabilities associated with different losses of these events, i.e. the probability distribution of losses. In insurance, risk refers to insured losses only.

Stochastic variants: “Stochastic variants” describes the methodology of using probability distributions instead of deterministic values in functions or models, e.g. for calculating risk (see Monte-Carlo simulation methodology, above).

Transboundary animal disease: Transboundary animal diseases are “those [diseases] that are of significant economic, trade and/or food security importance for a considerable number of countries; which can easily spread to other countries and reach epidemic proportions; and where control/management […] requires cooperation between several countries”.[258]

Trigger: The mechanism that activates contingent funds requires a variable, called the index, and a determination of a value for the index, called the trigger. Further explanations on the selection of a trigger and an index can be found in Annex 1 of Part II of this report.

Zoonoses: Any disease and/or infection which is naturally transmissible from vertebrate animals to man.[259]

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[258] Otte, M.J., Nugent, R. and McLeod, A.

[259] The World Health Organisation (2007) http://www.who.int/zoonoses/en/

Annex 4: Executive summary of report *Enhancing control of highly pathogenic avian influenza in developing countries through compensation: issues and good practice*[260]

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[260] World Bank (2006a)

Executive Summary

Highly pathogenic avian influenza (HPAI) under current conditions poses a major risk to human and animal health. Efforts to contain the disease are therefore in national and global interest. As the most widely practiced control methods for poultry involve culling birds that are infected or in regions immediately around infected animals, the most common practice to ensure the cooperation of owners of birds is to compensate them for the culling of their animals to achieve this public goal. Early identification of HPAI and the immediate culling of diseased or suspected animals are critical elements of reducing the risk of the disease spreading. The international community and national governments have responded to this challenge by establishing funding mechanisms to enable compensation to assist in this strategy.

Payment of compensation to farmers whose animals are being culled enhances producer cooperation through better motivation to comply with the disease reporting and culling requirements of disease control packages. It reduces the time lag between an outbreak and containment actions, and hence diminishes the overall cost of control. To the extent that it reduces the virus load, it also reduces the risk of the virus mutating to becoming transmissible from human to human. Enhancing early reporting and complete culling of diseased or suspected birds is thus the first objective of compensation schemes. A second objective can be to reimburse losses of private citizens who have complied with a disease control process for the public good. This is compatible with the first objective.

While the imperative of disease containment drives compensation schemes, the reality of the severe impact of culling on very poor people cannot be ignored. However, a compensation scheme cannot cover all livelihoods losses caused by livestock disease control and it cannot replace social safety nets. This requires other measures, outside the scope of this paper.

The report seeks to provide guidelines on good practice for payment of compensation as part of HPAI stamping-out strategies. It is meant for national and international managers and project staff involved in containing HPAI. It responds to a request of the Senior Officials Meeting on Avian and Human Influenza held in Vienna, June 6–7, 2006, and the result of the work of a multidisciplinary team from the World Bank, FAO, and IFPRI. The report is based on review of the well-established literature of compensation practices in the developed world, staff interviews, experience, and newly emerging gray literature (project documents, mission reports, and so forth) on compensation in the developing world, and specific field visits to Egypt, Indonesia, and Vietnam.

Preparedness Is Key

An effective and efficient compensation scheme will compensate the appropriate beneficiaries for the appropriate losses and at an appropriate level, with only a short interval between culling and payment of the compensation. This will only be possible if a number of elements are already in place before an outbreak. There needs to be appropriate legislation for the control of animal disease in force that spells out clearly the rights and responsibilities of government, livestock sector and marketing personnel, and farmers in animal disease control. There needs to be widespread awareness of the dangers of the disease and how to mitigate them. Funds have to be readily available and the procedures and sequencing of actions to be followed for compensation need to be agreed in advance. Preparations for the implementation of expedient and transparent payment schemes need to be in place.

Procedures and sequencing of compensation require knowing who to compensate, when, how much, and how, and all the stakeholders have to be aware of and have faith in the system. Widespread knowledge in advance of what the stakes are (including poultry holdings) and identification of the stakeholders are key elements in improving the governance of the use of compensation resources, which is especially difficult in emergency situations.

Because preparedness is essential to using culling and compensation effectively and efficiently for disease control, countries need to make a host of arrangements without necessarily having national precedents to guide the way. The present document tries to illustrate key lessons from countries such as Thailand and Vietnam (and others) that have learned by doing and incorporated many of the lessons in revised strategies. Even with guidelines from elsewhere, national avian influenza committees will still need to negotiate specific arrangements with national stakeholders in a way that fits local conditions, and this takes time and effort.

Countries faced with outbreaks before they have their contingency plans in place will need to adopt the most basic measures. Even so, the same issues of who to compensate, when, for what, how, and how much still apply. However, the need to move quickly for disease control will force many of the normal oversight tasks to a later date and is likely to make governance issues even more difficult.

Finally, it will be difficult to delink compensation practices from both changing needs for effective disease control and the issue of equitable production systems change as the disease becomes endemic. This aspect is also introduced briefly in the concluding chapter.

Identification of Beneficiaries

As a general rule, the beneficiaries of compensation are the owners of the animals. Other supply chain participants, such as feed suppliers and market operators, may also incur losses when livestock production and sales are disrupted by disease, but they have not normally benefited from compensation schemes. The type of production system significantly shapes feasible identification procedures. Large, highly biosecure poultry farms (the so-called sector 1 and 2 under FAO/OIE nomenclature) have generally good inventory records and culling is well controlled. Farmer documents are then a basis for compensation.

Under conditions of contract farming in these systems, ownership of the birds decides the beneficiary. If the contractor is the owner, he/she would be compensated, and takes the responsibility for reimbursing the integrator. If the integrator owns the bird, he/she will receive the compensation. In a few cases, arrangements have been made to pay the contractor for lost income on a wage per day basis, with funds subtracted from the integrator share before payment. The issue of how to incorporate contract growers into compensation process remains a problem that many countries are only now beginning to look into. More attention needs to be addressed to this issue lest it becomes a loophole limiting effective control of the disease.

Identification of the beneficiaries for small enterprises and back yard systems (the FAO/OIE denominated sectors 3 and 4) is more complex, as records are normally not available, and factors such as differential ownership by gender come into play. Surveys as part of the preparedness planning (not after the disease emerges), including the identification of ownership patterns, broad awareness of the existence of compensation and payment as an integral part of the stamping-out process, are then key factors to ensure a broad participation of the sectors 3 and 4.

Type of Losses to Be Compensated

Normally, compensation covers only the so-called direct losses, which include the value of the animals, and sometimes also (in richer countries) the costs related to the disposal of dead animals and cleaning and disinfection. So-called farm-level consequential losses, due to business interruption, movement control, and price effects are not compensated, although in many developed countries private insurance schemes exist for such losses. Dead animals before culling are often not compensated, however there may be a rationale to do so at least partially where either dead animals have market value (and thus there is the danger they will be sold) or disease control teams cannot respond within 72 hours of disease reporting by the farm in question. In all cases the accurate computation of losses is greatly aided by having adequate farm-level records of poultry holdings, and it will be important to promote such a database prior to disease outbreak. Finally, the lion's share of actual economic losses to the countries in question may be indirect: lost feed sales, diminished tourism, absenteeism at work, and so forth. These losses are never covered by public compensation schemes. In principle, they could be insurable under private sector contracts outside the livestock sector if risks are well known, but they rarely are.

Setting Compensation Rates

Compensation rates are variously set on the basis of (a) market value; (b) budget availability; and (c) production costs. Setting the cost on the basis of market value, wherever possible, is the preferred policy, as basing the cost on budget availability often leads to underpayment, and hence poor compliance with the culling operation, and production cost would favor inefficiencies, and is more complex to establish. Experience that emerges from the review in establishing compensation rates based on market values shows:

- Compensation rates as a percentage of a reference market price should be set before the disease emerges, as part of an overall preparedness plan, using average preoutbreak market prices at the farm gate, computed with due regard for seasonality and the transport costs from the local community relative to the reference market. For special category birds (rare breeds, indigenous poultry, fighting cocks, grandparent stock, other bird types), where market prices are not readily available, consultation with the stakeholders is required to set realistic levels.
- Uniformity of rates across the country and for different classes of birds improves the implementation efficiency of the program, and should be pursued in situations with good control. However, in situations of poor movement control, differentiation by type of bird (layer, broiler) and age/weight of the group might be needed to fit compensation as close as possible with prevailing market prices. An interesting intermediate solution might be to pay not on the basis of numbers but on the basis of the total weight of the flock.
- Compensation rates should be no less than 50 percent of the reference market value of suspected birds at the farm gate, and no more than 100 percent. The rationale for the preferred range of 75–90 percent of the reference price and multiple considerations for being closer to one or the other limit are discussed in the report. Rates should be considerably lower for diseased birds and even less, but positive, for dead birds, to provide positive incentives for early and complete reporting. Careful attention needs to be paid to bird movements during compensation to ensure that an incentive is not being created for the influx of healthy birds to disease zones or diseased birds to disease-free zones.
- In dealing with small farmers in developing countries, compensation should be paid within 24 hours of culling by cash (or possibly voucher where handling cash presents a security threat and credible local formal financial institutions such as rural post offices are available); any delay is likely to have a significant effect on reporting.

Establishing Awareness

Experience from on-going campaigns highlights the absolute necessity of communication on disease control and compensation, which when done properly may run from 10 percent to 20 percent of the total package cost. The package should contain components of consultation with the beneficiaries, advocacy, and information, using multiple media and channels. The specific messages on compensation should explain to affected farmers the need for mandatory culling in cases of suspicion of avian influenza as a necessary measure to protect the health of the entire human population. They should contain the principles, procedures and grid of compensation levels, precise information on the exact amounts, and payment procedures. Messages and media should be prepared ahead of time with inputs from both technicians and communication specialists. They should also be consistent over time, since frequent policy and message changes undermine the credibility of the campaign. Private sector operators, such as para-veterinarians, can play a critical role in awareness raising and overall support to the campaign, and their input on retainer fees should be more encouraged than is currently the case.

Payment Systems

To promote early notification of suspected outbreaks, compensation for culled birds must be paid promptly following the birds' destruction. Critical elements from an appropriate payment system follow.

- Rapid access to adequate funding for immediate deployment as needs arise is essential. Sources typically are government's own funds from the National Treasury, farmer's contributions, and those of donor partners. National budgets need contingency funds of at least 3–5 percent of total budget to facilitate a rapid central contribution in the event of an outbreak; alternative contingency planning will be necessary where this is not available.
- The share of compensation payments in total animal disease control expenditures under outbreaks ranged from 0–45 percent in the cases studied, with a central tendency of about 35 percent. Holding large sums as contingency reserves to allow a rapid response engenders a considerable cost. For compensation planning purposes, the upper range of foreseen culling during a severe outbreak should be capped at 10 percent of the national flock. Many outbreaks are controlled with culling of less than 1 percent of the national flock. Once the share of infected and closely associated birds exceeds 5 percent of the total national flock, vaccination typically starts substituting for culling and compensation. These percentages, multiplied by the size of the national flock and again by 75 percent of the average farmgate poultry price, provides a rough estimate of the range of funds that need to be accessible for compensation payments per se on short notice. Countries that are important poultry exporters and wish to avoid vaccination (such as Thailand under its 2004 outbreak) should plan at the 10 percent (high) limit, countries with little in the way of poultry exports and a large percentage of smallholder poultry producers at 5 percent, and countries with little trade concern, a high degree of biosecurity, and a creditworthy public finance system at 1 percent.
- The system should be simple enough to be used in difficult field situations and should make use of existing institutions (for example, line ministries, veterinary services, financial institutions). It is important to clarify responsibilities in advance, make provincial cross-agency coordination arrangements, and establish local contingency funding. If no system is in place when the disease emerges, the focus will need to shift to a greater reliance on ex post independent scrutiny to avoid inordinate delays in paying compensation.
- Eligibility databases and emergency payment (see above) procedures should be prepared as part of the emergency part preparedness plans; where lacking, they will both need to be set up when the disease emerges, posing considerable difficulties.
- The veterinary services (assessing the need and reliability of the culling), the Ministry of Finance (payment), civil authorities (security), and community leadership (transparency) should all be directly involved in the payment process.
- For sectors 1 and 2, bank transfers are the most adequate instrument; cash payments are the preferred method for those farms of sectors 3 and 4 without banking access. Vouchers are often less credible for immediate motivation of rural households, but may work where they can be integrated with a dense local network of trusted financial institutions, such as rural post offices.
- To the extent possible, maximum use should be made of local banking entities, producer's organizations, veterinary services, and nongovernmental organizations (NGOs). Their fiduciary assessment should be part of the preparedness planning.

The Way Forward

While over time the international public good argument regarding the risk of human-to-human transmission of HPAI might diminish, transmission between animal populations of different countries will continue to be a main reason for international funding of disease control in developing countries. Moreover, in the likely event of the disease becoming endemic within certain countries, this will have major effect on the poor, and interventions under those conditions therefore deserve international support from an equity perspective. Stricter disease control requirements will have a major effect on the structure of the industry, with implications still to be clearly identified for the future viability of the sectors 3 and 4. Nonetheless, compensation is likely to remain necessary for many years to come to promote the early eradication of outbreaks and to avoid the spread of transmissible animal diseases.

Under such conditions, compensation will:

- Become part of modified stamping-out strategies, with probably a lower priority to culling. Clear principles of how stamping-out strategies should evolve, and how compensation fits into such evolving strategies are needed.
- Have to become more dependent on the countries proven political will to improve the key institutions for animal health, in particular for early alerts and independent disease reporting. The OIE tool for Performance, Vision and Strat-

egy (PVS) is a useful instrument to assess government capabilities.

- Be restricted to sectors 3 and 4, and be funded from a mixture of national and international public funds, the latter in particular for the poorer countries.
- Be funded for the large commercial sectors through private initiatives, probably as a mix between mandatory levies and voluntary insurance; in many cases the public sector needs to work with the private sector to find equitable ways to develop these systems.

The World Organisation for Animal Health (OIE)

Prevention and control of animal diseases worldwide

Pre-feasibility study – Supporting insurance of disease losses

Final Report
Part III

Submitted by:
Civic Consulting - Agra CEAS Consulting

Part III prepared by Civic Consulting

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September 2007

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Acronyms

AI: Avian Influenza

BRM: Business Risk Management

CIS: Community of Independent States

FAO: Food and Agriculture Organisation of the United Nations

FMD: Foot-and-Mouth Disease

GDP: Gross Domestic Product

GERFAE: Global Emergency Response Fund for Animal Epizootics and Zoonoses

GPAI: Global Programme for Avian Influenza

OIE: World Organisation for Animal Health

PML: Probable Maximum Loss

PSRMP: Canadian Private Sector Risk Management Partnerships programme

PVS: The OIE's Performance, Vision and Strategy criteria

RMB: Chinese Yuan

Rs: Indian Rupees

RUR: Russian Ruble

SVD: Swine Vesicular Disease

US$: United States dollar

Executive summary

Methodology used

This pre-feasibility study was conducted by Civic Consulting in the period November 2006 to March 2007 and updated in September 2007. The study has been based on a global survey of insurers and insurance associations, often supplemented with interviews and in-depth case studies of regions with existing insurance products for epidemic livestock diseases. It also included a review of available literature.

Study focus

The study gives an overview of the epidemic livestock disease insurance products that are available in some markets, and determines barriers that have prevented their development in others. Finally, it analyses preconditions for market-based insurance products in developing and in transition economies and presents options to support the development of market-based insurance products.

Conclusions

A main pre-condition for developing epidemic livestock disease insurance is the existence of a well-planned government disease prevention and control programme. It is assumed that a market-based product would need to be fully aligned to a well-prepared government slaughter and compensation programme. A crucial element is an appropriate veterinary service. However, the effectiveness of the veterinary services, and of its ability to implement disease prevention and control, is also affected by the structure and degree of commercialisation of the livestock sector in each country. This varies significantly from one country to another.

Any scheme to support the development of epidemic livestock disease insurance would have to take into account that each country has different circumstances concerning rural insurance, capacity of insurers, as well as organization and disease status in the livestock sectors. Each country would require tailored adaptation of epidemic disease insurance solutions, although this could be eased within a framework for international standardization in product design, backed by international technical assistance, capacity building and reinsurance. Innovative solutions for product distribution, farmer enrollment and loss assessment seem essential in the absence of existing synergies and the current poor development of livestock insurance.

A high level of capacity building would be needed by the insurance sector in most developing countries, and high levels of technical assistance to undertake development of products, risk assessment, product pricing, and support for insurers. Within each country, an integrated approach to any market based insurance solution is required, where linkages could be forged to initiatives such as creation of farmer databases, livestock registration, classification of herds, and disease prevention. Insurers could play a part in such a process, but they would only be one stakeholder in a wider range of organisations and initiatives aimed at prevention and management of epidemic disease.

Given the infrastructural and technical constraints to market-based epidemic insurance identified throughout the study, the conclusions are very guarded as to the potential for a "scheme" for the development of market-based insurance products. In particular, no "universal" scheme can be foreseen which would be suitable for application in all countries. In spite of the negative outlook for a scheme for market-based epidemic insurance, there are high degrees of synergy between the needs of the insurance market, both for conventional livestock mortality insurance and for epidemic disease insurance, in the strengthening of governments' measures to improve veterinary services, and associated measures, in particular in establishing a database for the registration and identification of the national livestock herds and their owners.

Based on these considerations, the study discusses strategies which could directly encourage private sector epidemic insurance, and strategies which could indirectly encourage private sector epidemic insurance.

The report in brief (extended summary)

This pre-feasibility study was conducted by Civic Consulting and is Part III of a series of economic studies on the financing of animal epizootics and zoonoses losses in developing and transition countries, commissioned by the OIE with support from the World Bank. The study has been based on a global survey of insurers and insurance associations, often supplemented with interviews and in-depth case studies of regions with existing insurance products for epidemic livestock diseases. It also included a review of available literature. The study gives an overview of the insurance products that are available in some markets, and determines barriers that have prevented their development in others. Finally, it analyses preconditions for market-based insurance products in developing and in transition economies and presents options to support the development of market-based insurance products.

Livestock disease insurance in developing and in transition countries

Insurance sector

The development of the insurance sector in emerging markets remains limited in comparison to industrialized countries. In 2005, industrialized countries accounted for 88% of global premium, and emerging countries 12%. Average per capita non-life premiums were $3,287 in industrialized countries compared to $77 in emerging countries, accounting for 3.82% and 1.42% of GDP respectively. However, growth rates of premium income have been stronger in emerging markets.[1] Most developing countries have liberalised domestic insurance markets, which were dominated by state owned insurance companies. International insurance groups have increased their involvement, by joint venture or acquisition of local, state-owned or private companies.

In developing countries, insurers have concentrated on motor, industrial and life business, mainly focused in urban areas. There are significant difficulties for insurance companies to penetrate into rural areas. Small farm size, low insurance awareness, low economic capacity, poor rural distribution networks and high rural transaction costs all conspire to make rural markets unattractive to insurers. In spite of this, there has been a strong desire by governments and insurers to find solutions allowing improved access to risk management and insurance for farmers. Microinsurance has increased, but less rapidly than microfinance. There is a long experience of crop and livestock insurance in developed countries, where markets are mature. Where agricultural insurance has been tried in developing countries, the focus has been on crop insurance. Creating viable crop insurance programmes in developing countries has proved problematic. Innovative product development, such as weather index products, has been introduced in a few countries to try and overcome limitations of traditional crop insurance products.[2] Crop insurance has been a higher focus than livestock insurance for most developing countries.

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[1] Swiss Re (2006) in from Sigma Report No. 5 (2006): World Insurance in 2005

[2] World Bank (2005)

In terms of global *agricultural* insurance premium (crop and livestock), most is generated in North America (58 percent) and Western Europe (28 percent). Asia accounts for about 4 percent and Latin America has 3 percent. The rest of the world comprises the remaining 6 percent. World-wide most agricultural insurance is for crops – representing 71 percent of the global premium for agricultural insurance (hail crop insurance is 22 percent and multiple peril crop insurance is at 49 percent). Only about 12 percent of global premium is for livestock (not including sporting or companion animals).[3]

Livestock insurance products which are marketed in developing countries are individual animal accidental mortality policies, sometimes including limited disease, targeted at high value breeding stock. Penetration is very low, reflecting the fact that this type of product is not attractive or economic to small farmers, and because of major underwriting and loss adjustment challenges for insurers. Where such individual-animal policies are sold, for example in India and some South East Asian countries, they have often been linked to credit for livestock, or linked to government programmes for the introduction of improved breeding stock. Individual-animal mortality policies are not feasible for lower value production livestock. Insurers have considered the introduction of herd-based deductibles, where a given number or value of animals must be lost before a claim can be made. Such policies would only be feasible for large herds, and sales of such policies are very limited even in developed countries.

Industrial pig and poultry sectors can be more attractive to insurers, due to controlled indoor production conditions. Cover for livestock within these units has been offered through an extension of a property insurance policy, to cover consequential loss mortality arising from specific property insurance perils, such as fire, smoke or machinery breakdown. Property and business interruption policies do not normally cover disease.

From the above review, it can be seen that from a global perspective, the current involvement of the insurance sector in agricultural areas, and particularly with livestock producers, is very limited. Epidemic cover is even more limited, and restricted to a few developed countries.

This review also shows that there is limited potential product overlap with an epidemic product, which could be linked to government measures for disease control or eradication, and there are limited existing distribution channels to livestock producers. Further, as few insurers are specialized in agriculture, they would generally require significant capacity building to become involved in epidemic insurance programme design and implementation.

Reinsurance sector

Reinsurance (the insurance of insurance companies) is a way of insurers for accessing additional capital, allowing efficient transfer of risk, and expansion of risk acceptance capacity beyond the scale which would be allowed by internal capitalisation and reserve accumulation of the insurer. Reinsurance is particularly important for products with catastrophic (co-variate) exposure, such as drought, flood or epidemic disease. Financial capacity of national insurance markets is limited in many developing countries, and reinsurers play an important role.

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[3] International Cooperative and Mutual Insurance Federation (2004), p12-13

Reinsurance availability for agricultural schemes has been highly problematic in developing countries. Whilst international reinsurers have been willing to support domestic insurers in well established property, casualty and motor lines, both crop and livestock insurance present a different level of underwriting difficulty for both insurers and reinsurers.

Acceptance of any reinsurance business by a reinsurer only follows a process of due diligence, which includes not only the analysis of the specific risk or portfolio of risks being offered, but also assessment of the integrity, operational capability and financial status of the insurance company, and of country risk. Relationships between insurers and reinsurers become established over a period of time, normally based on core business (motor, property, engineering, aviation, etc). Insurers in developing countries have, either through their own initiative or under government pressure, sought to develop agricultural products and expand in the rural areas. The reinsurers are normally the first port of call of the insurers, seeking technical assistance as well as financial capacity.

Reinsurers have found it difficult to meet the demands of insurers in developing countries, mainly for the following reasons:

- First, there has been a high need for technical assistance in design and implementation, particularly in the start-up phase. The costs of technical assistance are often high in relation to expected transaction size;

- Secondly, there have often been poor underwriting results, particularly in crop insurance, so the attractiveness to provide technical assistance and reinsurance capacity is limited;

- Thirdly, agriculture is often faced with more important infrastructure constraints than lack of insurance. Both insurers and reinsurers are frequently faced with small farm sizes, high costs of distribution, low economic capacity and lack of insurance awareness of farmers. Underwriting and loss assessment is difficult for individual-farmer policies, and there is often a lack of long term, reliable statistics needed for risk assessment and pricing.

Reinsurers have provided livestock reinsurance treaties for mortality, normally on a restricted basis and for accidental mortality. Disease is often excluded, and certainly epidemic disease, or government slaughter. Demand for livestock insurance was often from a few breeders with high value animals, or for wealthy bloodstock owners. Many insurers, however, wish to demonstrate that they can offer bloodstock and livestock, even if volumes of business are minimal.

Reinsurance for agriculture is dominated by a few of the major reinsurance companies operating internationally. There are very few domestic or regional reinsurers with technical departments familiar with agricultural risks.

In spite of this negative background, some reinsurers are actively interested in expanding and diversifying their agricultural portfolios, and are willing to consider new programmes and proposals, provided that there is a prospect of viability, and volume of business which is of interest. The prospect of building a global portfolio of diversified epidemic risks would be more attractive to reinsurers than individual national programmes. However, the situation of each country is unique, requiring adapted national programme design.

Pre-conditions for market-based epidemic livestock disease insurance programmes in developing countries

This report considers that there are many barriers to the introduction of market-based epidemic insurance in developing countries. However, pre-conditions can be listed, and would apply on a country-by-country basis:

The most significant pre-condition for the introduction of market-based epidemic insurance in a developing country is that there must be at least one insurance company in the country willing and able to take a commercial interest in establishing and distributing an epidemic disease product. Several insurers can be involved in a pool, and a lead insurer would normally be appointed by pool members. This collective approach has benefits where each company and specific individuals can be allocated by each insurer to contribute during the developmental phase. Once operational, the pool would agree to an annual plan, and appoint a lead insurer who would be responsible for risk acceptance. These insurer(s) would form a stakeholder group with other parties interested in market-based epidemic insurance. In reality, such an initiative would only follow a government plan to strengthen disease management and direct compensation, and would be linked to external technical assistance, and to the support of interested reinsurers.

Other pre-conditions for developing the insurance sector regarding epidemic disease insurance products would be likely to include:

- insurable client base of farmers in engaged in the commercial livestock sector;
- existence of an effective national epidemic disease strategy and operational infrastructure including veterinary services;
- agreed government compensation system for direct losses, backed by access to adequate national or international funding;
- defined linkage of the market-based programme to the rules and operations of the government programme of compensation, for the purposes of declaring outbreak, defining slaughter and quarantine zones etc;
- clear definition of covered and excluded diseases, and diagnostic capacity;
- existence of, or establishment of, a geographically zoned client and livestock database;
- distribution channel(s) to reach farmers, either directly or through linkage to other organization(s);
- access to external specialists able to provide the insurer with technical assistance during the feasibility study and design phase, and ongoing support;
- access to data and modelling of each covered disease, to permit estimation of maximum probable losses, establishment of appropriate financial limits, and setting of premiums;

- access to reinsurance and financial structuring;
- a viable business plan able to demonstrate the prospect of a profit margin to the insurer, after considering distribution and overhead costs, and reinsurance costs;
- adequate legal and regulatory framework.

Pre-conditions for developing the reinsurance sector regarding epidemic disease insurance products include those points listed under "insurance sector", plus:

- assessment of the capacity of the insurance company(ies) to manage the proposed market-based programme;
- assessment of the adequacy of operational procedures of the original programme, including risk acceptance, loss assessment, veterinary testing and controls, including catastrophic event preparedness;
- assessment of exposure to anti-selection and moral hazard;
- assessment of adequacy of proposed premium rating, limits, terms and conditions of the original programme;
- setting of reinsurance structure, particularly the layering of risk for non-proportional reinsurance, in relation to expected frequency of claims. Reinsurers will require defined limits to their financial liability, by district, province and in total;
- acceptable return on capital allocated, according to each company's internal acceptance practices;
- an opportunity for diversification of risk nationally or internationally would make the overall programme more attractive but need not be a pre-condition to a particular national proposal.

Challenges faced in supporting the development of market-based insurance products

A main pre-condition for developing this type of insurance is the existence of a well-planned government disease prevention and control programme. It is assumed that a market-based product would need to be fully aligned to a well-prepared government slaughter and compensation programme. A crucial element is an appropriate veterinary service. The OIE PVS instrument could be very valuable in assessing it. However, the effectiveness of the veterinary services, and of its ability to implement disease prevention and control, is also affected by the structure and degree of commercialisation of the livestock sector in each country. This varies significantly from one country to another.

Any scheme to support the development of epidemic livestock disease insurance would have to take into account that each country has different circumstances concerning rural insurance, capacity of insurers, as well as organization and disease status in the livestock sectors. Each country would require tailored adaptation of epidemic disease insurance solutions, although this could be eased within a framework for international standardization in product design, backed by international technical assistance, capacity building and reinsurance. Innovative solutions for product distribution, farmer enrolment and loss assessment seem essential in the absence of existing synergies and the current poor development of livestock insurance. Key factors from an insurer's perspective include:

- In terms of **product design,** an agreed-value policy, with a claim triggered by defined government slaughter for **specified diseases**, and providing a payment to farmers which was supplementary to government compensation, would offer the simplest approach.
- In terms of **marketing**, few existing marketing channels exist for insurers to reach the rural community, and innovative solutions would need to be developed, preferably allowing **low distribution costs**. Often farmers have limited insurance awareness, and may have low willingness and ability to pay premium, and sales of such a market-based policy would need to overcome these hurdles. Demand for such a market-based product would need to be tested, as experience in crop insurance indicates that there is an unwillingness to purchase insurance for events occurring with low frequency.
- In terms of **risk acceptance**, simplified minimum acceptance criteria would need to be developed, compared to more complex risk acceptance needed for conventional livestock mortality insurance, which requires farm inspection and veterinary certification.
- In terms of **underwriting**, the key difficulty lies in **product pricing**, due to the absence of data required for risk assessment of frequency and severity of whichever specified diseases are to be insured, and difficulties in modelling expected future outbreaks. Further, new strains of disease (e.g. AI) may have unknown epidemiology and unpredictable financial impacts.
- In terms of **loss assessment**, it may be possible to follow government slaughter decisions, which for the insurer means a need for confidence in the independence and integrity of the services responsible for government slaughter decisions.

These factors demonstrate that a high level of capacity building would be needed by the insurance sector in most developing countries, and high levels of technical assistance to undertake development of products, risk assessment, product pricing, and support for insurers. Within each country, an integrated approach to any market based insurance solution is required, where linkages could be forged to initiatives such as creation of farmer databases, livestock registration, classification of herds, and disease prevention. Insurers could play a part in such process, but they would only be one stakeholder in a wider range of organisations and initiatives aimed at prevention and management of epidemic disease.

Finally, the financial management of the consequences of disease outbreak, with infrequent but potentially severe claims, require major risk transfer by domestic insurance sectors, which have low financial capacity and may be unwilling to commit significant risk capital to such types of insurance. International re-insurers would need to play an important role, and would be more interested in a programme which aimed to develop such cover in many countries, achieving some economies of scale in product and mechanisms, and some risk spread. The financial capacity and willingness of the insurance sector in each country means that major risk transfer is needed. Financial structures for national retention of risk, layers of commercial reinsurance, and possibly high-level government-backed catastrophe cover could be foreseen.

Conclusions on options for an Animal Epizootic Insurance Scheme to support the development of market-based insurance products

Global versus national approach to a scheme

Given the infrastructural and technical constraints to market-based epidemic insurance identified throughout this pre-feasibility study, our conclusions are very guarded as to the potential for a "scheme" for the development of market-based insurance products. In particular, no "universal" scheme can be foreseen which would be suitable for application in all countries. The extent to which market-based insurance could develop is strongly influenced, country-by-country, by the following national features:

- Degree of commercialisation of the livestock sector(s): Market-based epidemic insurance is a financial instrument and could only be feasible for farmers operating in the emergent or commercialised livestock sectors, where clients were willing and able to pay insurance premiums.

- Degree of development of the insurance sector in the rural areas: Current penetration of insurance markets into rural areas is, on average, low. Epidemic product sales would be hard where insurers do not have a rural client base or linkages to a distribution network. Similarly, the capacity of the national insurance market to develop expertise in underwriting an epidemic product varies according to the degree of sophistication of the market.

- Degree of development of government capacity for epidemic livestock disease management is a pre-condition to commercialised insurance: for example, veterinary services, epidemic risk management capacity, advance planning for epidemic outbreak, herd registration and databases. These characteristics differ widely from country to country, as does the current status of endemic and epidemic disease in each country.

A conclusion is that there is a wide diversity between countries in the pre-conditions existing for an epidemic product. This is in a context that there are very limited private sector epidemic insurance programmes even in industrialised countries. Hence, there is limited experience, in comparison to other classes of insurance, of epidemic scheme design and of best practices to act as examples for international transfer of know-how.

Countries could be classified according to the status of their livestock sector, of their insurance sectors, and of their government veterinary services to identify those that are likely to be most favourable to market-based epidemic insurance.

The existence of the PVS instrument provides a strong objective measure of veterinary services, and could be a starting point for assessment of the key preconditions. This is complementary to the objectives in terms of eligibility to GERFAE (see Part II).

Synergy of market-based insurance and GERFAE objectives

In spite of the negative outlook for a scheme for market-based epidemic insurance, there are high degrees of synergy between the needs of the insurance market, both for conventional livestock mortality insurance, and for epidemic disease insurance, in the strengthening of governments' measures to improve veterinary services, and associated measures, in particular in establishing a database for the registration and identification of the national livestock herds and their owners.

Further, the operation of a market-based product would need to be integrally linked to a government compensation system for livestock. All the measures foreseen as necessary to strengthen the effectiveness and efficiency of emergency preparedness, for example development of pre-outbreak emergency preparedness, and developing compensation protocols, and post-outbreak response capacity, are fully aligned with the needs for commercial insurance (see Part II). Thus, in spite of the constraints identified, the development of a sound governmental epidemic prevention and response programme could lay the foundation for the private insurance market to offer parallel products. This seems most likely to occur only in those countries with better developed or innovative insurance markets, where there are insurers specialising in the rural sector, where commercial livestock sectors exist, and developed distribution networks such as agricultural banks and microfinance organisations. Wider penetration of livestock insurance is seen in some transition countries.

A complimentary synergy between public compensation and private sector insurance is that insurance creates a formal contractual arrangement between insurer and the individual farmer, whereas public compensation standards, guidelines and rules are targeted to livestock owners in general. This contractual arrangement requires *ex ante* establishment of databases of insured farmers and their herds, and legally binding rules for claims payment. It requires accurate definition of insured and excluded diseases, which may be more generally defined under government compensation guidelines. In crop insurance, there are examples where the databases of insured farmers are superior to any government records of farmers and their production systems.

Strategies which could *directly* encourage private sector epidemic insurance include:

- Premium subsidy: Subsidisation of private sector epidemic insurance does not seem convincing, given that limited government financial resources are required, as a priority, to implement national risk prevention and control services, and in particular to provide financial compensation for compulsory slaughter. Subsidisation of a supplementary, private-sector, consequential loss insurance product would not seem sustainable, and certainly not in the context of a global scheme, although might be considered as a government measure in specific countries.

- Public sector reinsurance: This measure does not seem to a priority, unless bottlenecks in private sector reinsurance are identified. Private sector reinsurance may be forthcoming, provided that the original insurance programmes are viable. Key factors identified by reinsurers remain data for pricing, and independence of government veterinary services. The main constraints to epidemic insurance are in building national “ground up” programmes capacity, as “top down” financial instruments will not substitute for viable local programme design and operation. The existence of a national pool of insurers, or international pool of reinsurers, cannot substitute for sound local implementation, such as animal identification systems, animal health information, and database development.

- Promotion of public – private partnerships: Encouragement of pilot projects funded by a scheme similar to the Canadian PSRMP programme. PSRMP is a Business Risk Management (BRM) programme funded through the Agricultural Policy Framework which provides financial and technical advice to industry-led projects seeking new risk management tools developed and/or delivered by the private sector, in order to cover gaps in available farm-level risk management coverage. Such an initiative would bring together national and international representatives of the financial services industries to create projects, which may receive technical assistance funding.

- Technical assistance: As noted, it is unlikely that insurance or reinsurance markets will act as the prime movers for the development of private sector epidemic insurance. Preconditions to insurability are completely linked to the existence of government services, so that the development of such services is a pre-cursor. Hence, direct technical assistance to insurers does not seem useful in isolation. A phased approach could be foreseen, where insurers are increasingly involved, building on the initial development of sound epidemic preparedness and response. A degree of international standardisation implied by the current project would increase the cost-effectiveness of global technical assistance. Key aspects where technical assistance could be needed are to advise governments in strengthening disease management and in putting in place an *ex-ante* programme for direct compensation. Risk assessment tools required by governments would also benefit insurers.

Strategies which could *indirectly* encourage private sector epidemic insurance include:

- Development of government and international veterinary services capability: as a foundation for an insurance programme which supplemented the government compensation system. The synergy of this approach is described above.

- Establishment of improved information systems: available to insurers, to allow better assessment of livestock health and disease, and to encourage development of some internal technical capacity within insurers as a first step towards developing products (both epidemic insurance and traditional mortality insurance).

- Client and livestock database: An essential requirement for any insurance programme as well as for government compensation programmes is that there is a comprehensive database of farmers, and of the livestock held on farms. This is not only needed for the identification of livestock, but also geographical zoning for control purposes. An important issue in this respect is the definition of minimum requirements regarding the systems for (government) registration of herds.

- Classification of livestock sectors and disease risks: Development of best practices for management information system for a classification of livestock into categories, by livestock type, age, use and production system, which could also be a pre-requisite for government authorities responsible for disease management and direct compensation, is fully complementary to insurers' requirements. Development of herd identification, classification and databases, and access to animal health inspection and status reports, could benefit animal health management as well as provide a basis for confidence of insurers in livestock risk management by potential clients.

1. Introduction

Aim of the study

This pre-feasibility study is Part III of a series of economic studies on the financing of animal epizootics and zoonoses losses in developing and transition countries, commissioned by the World Organisation for Animal Health (OIE) with support of the World Bank. Insurers around the world have developed various livestock insurance products for epidemic livestock disease. This study gives an overview of the insurance products that are available in some markets, and determines barriers that have prevented their development in others. Finally, this pre-feasibility study analyses preconditions for market-based insurance products in developing and in transition economies and presents options to support the development of market-based insurance products.

Structure of the study

The structure of this study is as follows: Section 2 details the methodology employed for the study. Section 3 provides an overview of selected existing types of epidemic livestock disease insurance globally and concludes with an analysis of the strengths and weaknesses of existing schemes. It includes in depth studies of selected markets (US, EU, CIS, China, and India), the market situation for such products, barriers confronted in these countries and their prospects for the future. It also includes a technical comparison of different ways in which these products have been set up. Section 4 presents the pre-conditions for market-based epidemic livestock disease insurance in developing and in transition countries. This includes a consideration of the product design and financial characteristics. Challenges and options for an animal epizootics insurance scheme to support the development of market-based insurance products at the national level are presented in Section 5. The Annex includes the survey questionnaire and an overview of results of the insurers' survey conducted in the framework of the study.

Acknowledgments

This analysis would not have been possible without the support of insurers' associations and individual companies (brokers, insurers and re-insurers active in livestock insurance) that provided valuable input though a survey and interviews, and the support of other interview partners, including at the World Organisation for Animal Health (OIE), and the Food and Agriculture Organization (FAO). We also would like to thank organisations, such as *Agronomes et Vétérinaires Sans Frontières*, the European Commission (EC), the French National Institute of Agriculture Research (INRA), the Organisation for Economic Co-operation and Development (OECD) and the World Bank, which have authorized their experts to review the draft reports in depth. We would like to express our gratitude to the experts that provided very helpful written comments.[4] We also would like to thank Alain Dehove of the OIE and François Le Gall of the World Bank for the support and guidance provided throughout the study.

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[4] Participants in the peer-review process were asked to provide their expert opinion, without necessarily expressing the view of their organisation.

2. Methodology

The study has been based on the following resources:

- Global survey of insurers and insurance associations, often supplemented with interviews;
- In-depth case studies of regions with existing insurance products for epidemic livestock diseases;
- Expert and stakeholder interviews;
- Review of existing studies and reports by government institutions, academic institutions etc.

More details on the resources used for the study and the methods employed are presented in the following sections.

Survey of insurers and selected authorities

A systematic investigation into current insurance products and the market situation for such products globally was based on a questionnaire distributed to over 200 insurance companies, associations of insurers, re-insurance companies and brokers in Central and South America, Africa, Asia, the US, the EU, the CIS Countries and Asia. The questionnaire collected data on existing insurance products for epidemic livestock diseases as well as insurers' opinions on the strengths and weaknesses of their products as well as on future demand.

The response rate was quite satisfactory considering the rather limited number of private insurance companies and other relevant stakeholders that offer products for epidemic livestock diseases. In total, 30 filled questionnaires were collected from around the world.

Table 1 and Table 2 describe the profile of the respondents:

Table 1: Number of respondents to the survey

Respondents	Questionnaires received
Insurance companies	19
Association of insurers	4
Re-insurance companies	3
Brokers	2
Other	2
TOTAL	**30**

As can be seen below, there were fewer responses from regions where the insurance market is less developed, as a limited number of private insurers in these regions offer relevant products.

Table 2: Distribution of respondents to insurer's survey worldwide

Respondents	Questionnaires received
Europe (including non-EU and CIS countries)	11
North America	12
Central and South America	2
Africa	1
Asia and Middle East	4
TOTAL	**30**

Interviews

Interviewees were selected for their expertise in epidemic livestock disease insurance and also for relevant experience in developing such products. In-depth interviews have been conducted with the following persons:

Table 3: Key organisations interviewed

Interview participants	Organisation
Mr. Jean Christophe Garaix (AXA, France)	Re-insurance company
Mrs. Emma Stamper (Crowe Livestock Underwriting Ltd., UK)	Other (Underwriters)
Dr. Tobias Farny (Munich Re, Korea)	Re-insurance company
Ms. Annette Houtekamer-Van Dam (Eureko Re, Netherlands)	Re-insurance company
Dr. Karl Murr (Munich Re, Headquarters)	Re-insurance company
Mr. Thomas Heintz (Partner Re, Zurich)	Re-insurance company
Mr. William White, (Heath Lambert Group, UK)	Insurance Broker
Mr. Munyaradzi Daka (Lion Assurance, Uganda)	Insurance Company
Various interviews covering insurance/compensation issues have been conducted in Asia (China, South Korea, India), the US, as well as a number of South American, CIS and European countries.	Insurance Companies and other stakeholders

The interviews were conducted either by phone or face-to-face. Experts selected for interviews mostly completed an in-depth questionnaire before the interview and the interviews were mainly intended to clarify and provide additional information on selected aspects.

3. Existing epidemic livestock disease insurance products in selected markets

3.1. USA

3.1.1. Market situation for livestock insurance

The livestock sector represents roughly half of the total value of agricultural production in the USA,[5] but accounts for a small fraction of the agricultural insurance market in the country.[6] Private insurance cover for livestock related risks is available in the USA and offered by several domestic insurance companies and agents. In general, policies that cover the basic named insurance perils such as fire, lightning and theft are widely available. Cover for additional perils such as other weather related risks; accidental shooting, drowning, electrocution; attack by wild animals; injury from loading or unloading, building collapse, or overturn of conveyances; vandalism and malicious mischief are also offered for an additional premium, although animal mortality policies are more limited in their availability. It is estimated that only 10-15 domestic companies in the USA underwrite such products.[7] In general, any legal entity producing livestock could be a holder of such insurance policies although certain restrictions and guidelines may apply. Diseases are typically excluded for most food value animals, i.e., cattle, sheep, swine, poultry; although a few limited examples of livestock disease insurance, with exclusions, do exist (see below).

In addition to these insurance products sold by private companies, six federally supported insurance products that cover livestock have recently been introduced in the USA since the passage of the US Agricultural Risk Protection Act (ARPA) of 2000. The current products offered by the US Department of Agriculture (USDA) Risk Management Agency (RMA) mainly target price risk in livestock; production risks are mostly left uninsured, including disease. The products currently offered are Livestock Risk Protection (LRP) for hogs, fed cattle and feeder cattle; Livestock Gross Margin (LGM) for hogs; Adjusted Gross Revenue and Adjusted Gross Revenue-Lite (AGR-Lite) products. The LGM and LRP products are specifically targeted at livestock and cover price risk, they were first offered for hogs in 2002; the LRP covers livestock price risks, while LGM covers both livestock and feed price risk. The AGR products cover livestock as part of a whole-farm revenue policy, however the livestock revenues covered are only designed to represent the value of crop production fed to animals and coverage is limited. The AGR product was first offered in 1999.[8]

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[5] Koontz et al. (2006), Chapter 14

[6] Although exact figures cannot be found for the US market as a whole, indications can be found by looking at the business lines of reinsurers active in the US agricultural market. For example Partner Re's publications on their Agricultural business (http://www.partnerre.com/App_Assets/Public/153b0a90-8ef1-4a8f-ad88-b64439b62e37/Agriculture_English.pdf)and their US Speciality Lines, which include reinsurance for agriculture and livestock in the US (http://www.partnerre.com/App_Assets/Public/8ec5a5a6-ae0a-45cb-8173-e25e97148722/33400_6%20Specialty%20Lines.pdf), indicate the percentage of livestock coverage is small in comparison to crop insurance.

[7] Hansel H. Anderson, VP-Underwriting, Farmers' Mutual Insurance Company, PA, USA

[8] For more information, see Koontz et al. (2006), Chapter 14 and http://www.rma.usda.gov/

3.1.2. Epidemic livestock disease insurance products currently available

In general, disease is excluded from livestock insurance policies offered privately in the USA. Results from the surveys conducted with US insurers confirm this. Few examples can be found where epidemic disease coverage has been offered, although little information exists as to the precise details of this coverage, outreach and success of these programmes. For example, Wellington Underwriting Agencies Limited, manager of Wellington Syndicate 2020 at Lloyd's in London, announced in August 2006 that it was going to offer Avian Influenza business interruption cover to farmers in the USA. The product will cover business interruption for broiler farmers, who farm a particular type of young chicken. The coverage is triggered if the government slaughters their poultry following an outbreak of the H5N1 strain of Avian Influenza on their farms and is designed to supplement the US government Avian Influenza response plans.[9] However the extent of this programme and product uptake since the launch is not known.

Another example is Country Insurance & Financial Services Group, a group of affiliated insurance companies, who offer a Livestock Mortality policy that covers all disease that causes death to cattle, horses, swine, sheep, goats and dogs insured on the policy, to farmers in the state of Illinois. They also offer a more general Farm policy, covering broad perils such as theft, drowning by flood, accidental shooting, etc. where death by disease is not covered. Additional coverage via policy endorsements, such as interruption of business production, loss of income, loss of value for high valued livestock, etc. can be added to an existing Farm policy, for an additional premium. On their stand-alone livestock mortality policy, death by disease that is contracted and causes direct death to the insured livestock is covered, however with certain limitations and exclusions. In particular the policy does not apply to death directly or indirectly due to loss: caused by the destruction of any animal because that animal contracted, or was exposed to, any contagious disease, whether such destruction be by order of the federal government, state government and or any subdivision of government; all livestock that harbours infectious disease prior to the company's agreement to insure the livestock; caused directly or indirectly by the failure or neglect of the insured, the insured's agents or employees to give proper attention and care to the animal or animals described in the declarations, amongst other exclusions. Therefore, in the case of epidemic outbreaks when the state or federal government feels it is necessary to take action, the livestock mortality policy does not compensate a farmer for his destroyed livestock. According to Craig Conroy from Country Insurance & Financial Services Group however, Livestock Mortality policies are written on a limited number of livestock compared to the number of livestock covered on farm personal properties on the farm policies.

3.1.3. Prospects for epidemic livestock disease insurance

According to David Berry of The Hartford Financial Services Group, one of the largest US livestock insurers, the reasons they do not cover epidemic disease are primarily[10]: a) the potential for catastrophic loss due to the disease itself and the destruction of "potentially exposed" animals; b) the lack of either private or governmental reinsurance; and c) associated catastrophic loss related to the market value of unaffected animals, e.g. demand and market prices decline in the event of an outbreak, expanding the "loss due to disease" well beyond the actual affected area. Reinsurance capacity, the potential for catastrophic losses and uncertainty as to the frequency and magnitude of the underlying risk were also cited as barriers to market development by Michael Zielin of Partner Re[11] in Connecticut.

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[9] Lloyds. (2006). "Lloyd's offers US farmers Avian Flu cover." http://www.lloyds.com/News_Centre/Features_from_Lloyds/

[10] Personal communication, 14th December 2006

Insurance companies participating in the survey offered a mixed response to questions regarding potential growth of epidemic livestock disease insurance sector in the US. Respondents who believe the market will grow cite that producers remain concerned about potential outbreaks of BSE, FMD, Avian Influenza and others diseases – creating demand – as the main reason for potential growth. These respondents felt it will take a partnership of government and private resources; education of lawmakers as to the size of the exposure and involvement in product development; reinsurance capacity and reinsurer participation; producer knowledge of availability of such coverage and reasonable pricing to develop the market. Those who see limited future growth cite the lack of risk capacity, knowledge and understanding of the risk and desire to address these issues as the main reasons. Several feel that if a major disease epidemic should occur, the appropriate role of the government would be to provide financial, catastrophe assistance.

Following the ARPA in 2000 the US Department of Agriculture (USDA) Risk Management Agency (RMA) funded a study on livestock insurance. Researchers at Iowa State University held several listening sessions with livestock producers across the USA and discussed the various risks livestock producers face.[12] Most of the producers indicated that price risk, on both output and input markets, was their biggest concern. Hence the RMA developed the LGM and LRP products noted above. Producers indicated that production risk was of lesser importance and could be handled by risk management practices. Disease risk was not a major concern of the producers however the sessions were conducted before the BSE cases in Canada and the USA, the 2002 low-pathogenic Avian Influenza outbreaks in Virginia and the increased attention and coverage from the media of Avian Influenza in general.

Before the passage of the ARPA, livestock was explicitly excluded from coverage under federally supported agricultural insurance programmes. The language in the ARPA contains information on how livestock insurance coverage can be expanded in the future beyond the current RMA products and specifically lists livestock disease as one of the areas of possible expansion. However lack of data on livestock production risks and livestock disease, as well a Congressional funding, could inhibit RMA insurance development in these areas.[13]

3.1.4. Country Background: Public compensation scheme for epidemic livestock diseases

There is a long history of federal government involvement in controlling and eradicating livestock diseases in the USA going back to 1884.[14] The 5th Amendment of the US Constitution specifies, “nor shall private property be taken for public use, without just compensation”,[15] hence compensation was a key component of the government's response to disease outbreaks from the start. Current livestock compensation by the US federal government is directed in part by the Animal Health Protection Act, Subtitle E of the Farm Security and Rural Investment Act of 2002. The Act states that, "the Secretary shall compensate the owner of any animal, article, facility, or means of conveyance that the Secretary requires to be destroyed under this section".[16] In particular the Act establishes the following guiding principles: "the compensation will be based on the fair market value as determined by the Secretary"[17] and that compensation paid "by any owner under this subsection shall not exceed the difference between the fair market value of the destroyed animal, facility, or means of conveyance; and any compensation received by the owner from a State or other source for the destroyed animal, facility, or means of conveyance".[18]

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[11] Personal communication, 27th November 2006

[12] Koontz et al. (2006), Chapters 14 and 18

[13] Koontz et al. (2006), Chapter 14

[14] See Koontz et al (2006), Chapter 6, for history details. This section provides a short summary of this excellent chapter regarding the issues associated with US livestock disease insurance in the 21st century.

[15] Amendment V, Bill of Rights, United States Constitution from Koontz et al. (2006), Chapter 6

The Code of Federal Regulations Title 9, Part 50[19] states that "Animals for which indemnity is to be paid under this part must be appraised at their fair market value by an appraiser selected by APHIS"[20]. In practice there can sometimes be difficulties selecting someone with expert knowledge on-site to determine the worth of the animals to be destroyed in the time of an outbreak that has financial independence from their appraisal; hence an alternative standardized appraisal value process is being developed by the USDA. The standardized appraisal values are not based upon expert opinion of an appraiser but on measurable characteristics of the animal where animals classified into categories would then have the same value. The process has many advantages and efficiencies for USDA[21] and in cases where the standardized appraisal value plans have been tested; they have been well received by the livestock industry.

The US federal government will also often assist owners in the culling and disposal of the animals, by either performing these procedures or paying partial costs of having it done privately, to ensure animals are killed in a humane fashion and that the risk of disease spread is minimized. It has also in the past paid some of the costs associated with cleaning and disinfection following an outbreak to ensure it is done properly to respect environmental concerns. In general the US federal government does not get involved in compensation arising from indirect losses, such as lost of income associated with down time or business interruption, despite calls from the industry to expand the items eligible for compensation. One of the reasons for this is to provide incentives for owners to practice good bio-security in order to minimize the chance of diseases, among other practical issues.[22]

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[16] Public Law 107-171, from Koontz et al. (2006), Chapter 6

[17] Ibid

[18] Ibid

[19] From multiple years of the US Code of Federal Regulations, Koontz et al. (2006), Chapter 6

[20] Animal and Plant Health Inspection Service, part of USDA, http://www.aphis.usda.gov/

[21] See Koontz et al. (2006), Chapter 6 for a detailed discussion of the issues involved with the standardized appraisal value approach.

[22] For more details of the programme, readers should refer to Koontz et al. (2006), Chapter 6, for an excellent summary and discussion of compensation alternatives, such as industry-generated compensation funds, that have been established in some part of the USA where there are major concentrations of poultry companies.

3.2. European Union

3.2.1. General information

This section of the study describes livestock insurance policies currently available for farmers in Europe. The overview is based on a survey among 5 insurance and reinsurance companies respectively, 1 insurance broker, 1 underwriting company and 2 national insurance associations in 7 European countries and on an earlier survey[23] of a total of 19 insurance companies and insurance associations in 14 European countries. Hereafter, the term "insurer" refers to all respondents of the surveys.

Epidemic diseases in European agriculture are a recurring phenomenon. Recent illustrations are Foot and Mouth disease (FMD), Classical Swine Fever (CSF) and Avian Influenza (AI). Control measures include stamping-out infected herds and immediately establishing surveillance zones around infected herds. Losses to farmers related to control measures include direct disease losses (e.g. value of culled animals) and other direct production losses (e.g. losses from business interruption). Epidemic livestock diseases bear a high risk of loss accumulation, particularly in regions characterised by highly specialised and intensive farming.

Compensation of epidemic livestock diseases includes formalised compensation schemes and ad-hoc compensation. Compensation schemes can be categorised generally into three different schemes: (1) statutory compensation schemes; (2) non-statutory schemes; and (3) insurance covers. The latter scheme is analysed in the following sections.

3.2.2. Market situation for livestock insurance

Insurance cover for livestock is widespread in Europe. All countries surveyed do have insurance covers for livestock related risks such as death due to accidents or non-epidemic diseases (e.g. Brucellosis and IBR). The insurance products vary in their coverage of consequential losses. From Germany, Sweden and Spain it was reported explicitly that insurance companies cover losses of production or veterinary costs due to accidents or non-epidemic diseases. Livestock insurance covers are generally offered for cattle and pigs; some insurers also include poultry and other cloven-hoofed animals.

3.2.3. Epidemic livestock disease insurance products currently available

Epidemic livestock diseases generally involve many farms at the same time. Farms in an affected region can be infected or be confronted with control measures by governments (e.g. pre-emptive slaughter of contact herds or movement restrictions in surveillance zones). During the 1997/98 CSF epidemic in the Netherlands for example, 429 pig farms were infected with CSF and approximately 13,000 pig farms were affected by one or more control measures.[24] Because of the large number of farms involved, financial losses of epidemics in livestock can be catastrophic, especially in densely populated livestock areas. The extent to which private insurers can deal with the systemic nature of epidemic livestock diseases depends on many factors, such as the number and spatial spread of farms insured, the portfolio of the insurer and reinsurance capacity.[25] However, the market for insurance cover for epidemic livestock diseases is significantly smaller than livestock insurance market.

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[23] Civic Consulting (2006)

[24] Meuwissen (2000), p55

Insurance products for epidemic diseases are offered in 9 of the 15 surveyed countries. In most of these countries insurance markets complement the existing statutory schemes for epidemic livestock diseases. In other countries providing insurance cover for epidemic livestock diseases, policyholders have to purchase an additional, specific cover for epidemic livestock diseases.

The number of insurance providers on the national market reportedly varies from 1 (Switzerland) to approximately 10 (Germany). Information about the approximate share of farmers and the type of livestock insured against epidemic diseases is scarce. Approximately 50 to 60 per cent of German livestock producers contract insurance covers against business interruption losses. Swedish insurers estimated that 55 per cent of cattle have epidemic disease cover and Finnish insurers estimated that 70 per cent of the Finnish market was insured against epidemic diseases. The following information about the approximate number of farms insured was available from insurers responding to the survey in the following EU countries:

- United Kingdom: NFU Mutual insures 5,058 farms (cattle, sheep, pigs) insured against FMD; 7,729 cattle farms insured against Tuberculosis; 6,072 cattle farms insured against Brucellosis; 90 pig farms insured against CSF;
- Finland: About 20,000 farms;
- Norway: Livestock in 16,000 cattle farms, 2,300 pig farms, 1,200 poultry farms, less than 1,000 sheep farms.

Survey responses to questions concerning the total premium income and most significant claims against epidemic livestock disease were sparse. Total premium income ranges from approximately 500,000 Euros in 2004 for cattle in Spain to about 38 million Euros in 2005 for the national market leader in Germany. However, the latter figures include premiums for other insurance products (e.g. insurance for the recovery of high value animals and transport insurance for horses). The most significant claims reported were FMD in the UK (2001) and Brucellosis and Tuberculosis in Spain. Only insurers in Italy reported government support to private epidemic livestock diseases via premium subsidies. The government also offers support in Spain, where Agroseguro, a pool of more than 30 private insurers, is supported through subsidies for insurance premiums and by public engagement in stop-loss reinsurance. Insurance in force offered by Agroseguro only covers livestock insurance; though products covering epidemic livestock diseases are under development (e.g. insurance products for FMD which are in great demand according to Spanish insurers).

3.2.4. Product design

According to the surveys, only insurers in Germany, Norway, Sweden and UK systematically offer insurance products for epidemic livestock diseases with non-specialised cover. In other countries (these countries include Italy, Finland, Switzerland and Spain) coverage is offered at an additional premium, as a supplementary cover or as separately covered product.

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[25] Meuwissen et al. (2000), p10

In all of the countries that offer insurance products for epidemic livestock insurance several of the most contagious diseases are covered (e.g. FMD). Insurance cover for other diseases can be quite comprehensive or limited to a specific, definite list of epidemic diseases.

3.2.4.1. Underwriting procedures

Individual policies are offered to individual livestock owners in all surveyed countries. In some countries policies were also available for farmers` associations and other stakeholders. Standard period of validity of cover is 12 months; only insurers in Germany and Switzerland offer policies for longer periods. Common exclusions included in contracts are pre-existing diseases or natural disasters. Obligations of the policyholder include prevention measures to provide bio-security on farms. Four of the surveyed insurers do require specific measures while at least 3 do not. Only one insurer creates incentives to implement additional safety measures by a discount. Other, generalized obligations, which are required by 5 insurers, contain other hygienic and safety measures and timely reporting of disease outbreak.

3.2.4.2. Ratemaking procedures

Historical data about epidemics is limited due to the low frequency of outbreaks and continuously changing environment concerning prevention and control strategies.[26] Epidemiological models are often used to simulate the spatial and dynamic spread of epidemic livestock diseases and provide a basis to calculate losses due to epidemic livestock diseases. However, only one reinsurance company reported explicitly the use of epidemiological models to determine premium rates. In addition underwriters also analyse payback periods and the return on capital.

3.2.4.3. Claim settlement procedures

When asked about the trigger of coverage (i.e. the criteria that must be fulfilled in order for the insurance to apply), the surveyed insurers generally reported two categories of events. Once death or emergency slaughter or one case of disease is notified, the insurance policy applies to the claim. It is standard for the insurance companies to require a certificate issued by government.

In general, insurance companies which indemnify direct losses compensate the value of animals. Indemnification for consequential losses depends usually on several factors: (1) stipulated production value; (2) number of animals affected; or (3) period of business interruption or marketing restriction.

All insurers reported that they impose maximum ceilings on their claims. Maximum compensation is either defined in: (1) monetary terms; or (2) time limits. Most of the insurance policies include a deductible, either as a fixed rate or as a percentage of total losses. Some insurance contracts include partial or total reduction of indemnifications if outbreaks are not reported rapidly or if precautionary guidelines have not been observed.

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[26] OpCit, p4

3.2.5. Strengths and weaknesses of existing epidemic livestock disease insurance products

Several European insurance companies currently show that direct disease losses, as well as direct production losses (such as business interruption losses for farmers under veterinary restrictions) can be, to a certain extent, insurable without public involvement. However, the market for epidemic livestock disease insurance products is relatively underdeveloped. Insurance covers for epidemic livestock diseases are available in 9 out of the 15 surveyed countries. All of these schemes cover several of the most contagious diseases (such as FMD, which is covered by nearly all schemes). Insurance products systematically offered with non-specialised cover are only available in 4 of these countries.

According to responses of insurers, epidemic livestock disease insurance products are sparse. An insurer in the UK considered them to be fairly widely distributed, although market share in the UK is small in comparison to other countries. When surveyed about the operational effectiveness of insurance products, opinions were split. One of the Swiss insurers considered epidemic risks to be sufficiently covered while one insurer in the UK reported the need to cover losses of revenue due to epidemic outbreaks. According to the respondents, insurance covers for epidemic livestock diseases have an acceptable financial performance and most insurers considered their products to be satisfactory. Almost all of the insurers surveyed did not assess the level of satisfaction of their customers.

Insurance companies stressed the highly variable demand from farmers. Outbreaks of epidemics cause a great demand for specific covers of epidemic livestock diseases, while demand decreases significantly in the absence of epidemic diseases. Insurance companies considered that existing compensation schemes with public involvement were a reason for the weak demand for insurance products. According to the insurers, farmers feel sufficiently covered by public compensation schemes or expect ad-hoc measures from governments.

As mentioned above, reinsurance capacity influences the insurability of epidemic livestock diseases. Only one of the insurance companies considered reinsurance capacity to be inadequate. At present time, reinsurance capacity seems to be sufficient, although this statement should be accepted with caution considering that reinsurance capacity may become unavailable, or increase in price, following the outbreak of a specific disease.

3.2.6. Prospects for epidemic livestock disease insurance

Opinions about the future development of epidemic livestock disease were divided; half of the surveyed insurers considered epidemic livestock disease insurance to be a growth sector in terms of future development, while the other half did not agree. Reasons for not believing in the future development of this sector varied, but the main reason was that insurers did not consider it to be affordable nor profitable. Other commonly stated reasons were the lack of demand from farmers and inadequate reinsurance capacity.

On the other hand, increasing risks of epidemic livestock diseases (due to extended live animal trade and larger livestock units) are stated as the main reason for future development of insurance coverage in the field. Unsatisfied demand in farmers was perceived by a small number of insurers. Avian Influenza insurance was considered particularly in demand because of the potential of high losses brought about by the disease.

Respondents commonly suggested public financial support as feasible measures to encourage the development of epidemic livestock disease insurance. Public assistance included subsidies for premium and compulsory insurance schemes. According to respondents, the governments could assist insurance companies by supporting reinsurance programmes. Other suggestions included harmonisation of measures to be taken during epidemics.

3.2.7. Country Background: Public and other compensation schemes for epidemic livestock diseases

Public and non-public compensation schemes exist in most of the countries surveyed. Statutory compensation schemes are common. Among these, there are various combinations of financing methods ranging from high levels of financial participation from the stakeholders, to high levels of support by governments.

All reported statutory schemes cover the value of livestock. In seven countries, statutory schemes also compensate farmers for costs associated with culling, among other direct losses (e.g. costs for monitoring or losses from infected feed). Coverage of other direct production losses is provided by statutory schemes in only five countries. None of the statutory schemes offer complete coverage of all losses related to an epidemic outbreak. Only a few statutory schemes compensate prevention costs. In all statutory schemes most of the major epidemic diseases (e.g. FMD, CSF, AI) are covered.

Non-statutory schemes are primarily financed by contributions from farmers. These schemes offer very specific disease coverage varying in their coverage of direct or consequential losses.

Ad-hoc compensation unrelated to a public compensation scheme was provided to farmers who suffered losses due to restrictions on trade for breeding eggs during the 2000-2005 period, when there was an outbreak of Avian Influenza in the Netherlands. In that case, governmental payments added up to approximately 1.5 million Euros. In another case, farmers in the UK were compensated for welfare slaughtering of pigs in surveillance zones during an outbreak of Classical Swine Fever in 2000.

3.3. CIS countries (Russian Federation, Ukraine, Moldova and Kazakhstan)

3.3.1. General information

This report is based on the survey of livestock insurance programmes in CIS countries performed in December 2006, interviews with insurance companies in the region and a survey of Internet-based resources. There is lack of factual and analytical information available on Russian Internet websites of relevant institutions. Most of the websites provide basic descriptions of the insurance products and programmes and more specific information can be obtained only through direct contacts with the insurers. Besides, there is no statistical information about the programmes' performance in the previous years and assessment of the market volumes can be done only on the basis of information provided by the insurers and through expert appraisal.

Agricultural insurance in CIS countries is a part of property insurance statistics and it is virtually impossible to get official data on the number of agricultural contracts underwritten and losses adjusted. Such information is usually derived from the news, public press-releases and companies' reports. All CIS countries are currently working on design and establishment of the crop insurance systems which is presently considered to be more important than livestock insurance. Most countries decided to make subsidized agricultural insurance programmes voluntary. Some countries tried mandatory options (e.g., Ukraine in 2002-2003) but the parties involved, including governments, did not fulfil the programme requirements. Kazakhstan launched a mandatory crop insurance system in 2004. Farmer participation rate was high (65% - 2005), but the farmers claimed they did not like the administrative requirements and in 2006 they proposed to make this programme voluntary as in other countries.[27]

The livestock population had been decreasing in CIS countries until 2005-2006. Currently, commercial farms are expanding livestock operations and the numbers of poultry and pigs are growing. The Russian Federation has initiated a national project on livestock development; in 2006, about 52 thousand pedigree cattle were imported into Russia.[28] Purchase of pedigree cattle for this national project is subsidized by the government.

According to market reports and official statistics, there are about 20 million cattle, 8.3 million pigs and 256 million poultry at farms of all types in Russia. In 2006 Ukraine reported over 6.7 million cattle, 8 million pigs and over 180 million poultry being kept at farms of all types. In 2006 there were 316 thousand cattle, 514 thousand pigs and about 25 million poultry in Moldova.[29]

3.3.2. Market situation for livestock insurance

Livestock insurance is present in most countries in the CIS region (European part of CIS, Russia and Kazakhstan) however the volumes of insurance are small. The livestock is predominantly kept in private households and small farms (e.g. Ukraine – 60% of the livestock is kept by households,[30] over 80% - by households in Moldova[31]). The countries have developed systems with state veterinarian services with annual mandatory vaccination and medical checks. The governments provide assistance upon outbreaks of epidemics, which decreases the incentives for farmers to insure their livestock.

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[27] http://www.minagri.kz, www.gazeta.kz, Business and Power weekly (Kazakhstan)

[28] http://www.rosagroleasing.ru

[29] http://www.meat.ru/; http://minagro.gov.ua; http://mcx.ru

Livestock insurance programmes are not presently subsidized in CIS countries though this situation might change in the future as the interested parties discuss the option of livestock insurance subsidies similar to crop insurance subsidization.

Private owners and small farmers are the most active clients purchasing livestock insurance. They usually insure (milking) cows and less often pigs. Poultry is virtually uninsured by this category of clientele. Private owners and small farmers purchase approximately 75-80% of the livestock insurance contracts[32] in Ukraine and Moldova. The insurers usually offer special insurance products for individuals and small farmers which include a more extensive list of risks compared to the products offered to large and commercial farms.[33]

Large and commercial farms tend to purchase fewer contracts though they usually insure more livestock (500-1,000 cattle heads or 2,000-3,000 pigs per average contract). These clients usually insure the whole herd or pedigree animals. The insurers indicated that commercial farms started to import expensive pedigree cattle from European countries, Australia, USA and Canada and farmers usually want to insure such animals to avoid possible substantial losses. In Russia's recent national livestock development project, participating farms are eligible for a subsidized credit but they are required to insure their herd according to the terms of the programme. The insurers indicated that large farms often pledge their livestock to obtain seasonal or medium-term credits from the commercial banks. The finance institutions usually demand insurance of the collateral property which is one factor stimulating demand for livestock insurance in most CIS countries. The insurers from Russia and Ukraine stated that bank credit requirements are the main reason for commercial farms to insure their livestock. According to the insurance companies, approximately 90-95% of the insurance contracts were signed with commercial farms who were applying for credits.[34] Only insurers from Moldova claimed that risk management concerns were the main reason for purchasing livestock insurance in their country; however, the number of livestock contracts in Moldova is minor.

Poultry insurance contracts are usually purchased by commercial farms but their share in the total livestock portfolio is small. According to the insurers, poultry contracts constitute up to 20% of the total portfolio (60% is cattle insurance and 15-20% is pigs).[35] After the recent Avian Influenza epidemics this disease is mostly not insured against in Ukraine but the insurance companies in Russia and Moldova offer coverage against "bird flu". According to mass media reports, approximately 120 thousand household birds died in Russia in 2005 due to Avian Influenza. About 170 thousand household birds died in Ukraine in 2005 as the result of Avian Influenza epidemics.[36]

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[30] http://www.minagro.gov.ua/

[31] Information provided by Moldova insurance companies during phone interviews

[32] Information provided by insurance companies during interviews (Ukraine, Moldova)

[33] Programmes "Khatynka-Tvarynka" by TAS in Ukraine and "Buryonka" by Rosgosstrakh in Russia, information obtained from other insurance companies obtained during interviews

[34] Information provided by insurance companies during interviews

[35] Information provided by insurance companies during interviews

The insurers assert that epidemic situations happen rarely and only Avian Influenza epidemics have increased interest in poultry insurance, though it is still not popular. FMD has not been recorded in Ukraine and Moldova over a long, continuous period (about 30 years) so the insurance companies in these countries do not treat the disease as a serious risk for their portfolio. Nevertheless, most companies in Ukraine exclude FMD, Avian Influenza and some other diseases (Brucellosis, Tuberculosis, Leucosis, etc.) from the list of the risks to be covered by their insurance products for livestock.

Livestock insurance in the Russian Federation is offered by approximately 50 companies but 10 companies dominate this market segment. Rosgosstrakh[37] holds the biggest share of the livestock insurance niche as well as in the overall agricultural insurance sector. This company has the most developed network of regional offices that allows them to reach many potential clients throughout Russia. In 2006 there were several claims in the Russian Federation for FMD and Avian Influenza as well as other diseases, but the insurers stated that the loss ratio on livestock insurance products was approximately 30-35% (higher in the private household segment and lower in the commercial farms segment). According to estimates the insurers cover about 500,000 cattle and pigs (100,000 – in commercial farm sector) and up to 20 million birds (chicken, geese, ducks, ostriches, etc.) per annum. The annual insurance sum on cattle and pigs constitutes approximately 350 million US$ and 28 million US$ on poultry. The annual premium sum collected is estimated at the level of 0.8 million US$ for their poultry portfolio and 6-7 million US$ for cattle and pigs.[38]

About 40 insurance companies operate in the agricultural insurance sector in Ukraine, though more than 70% of the market is controlled by 6-7 companies. Oranta insurance company is the leader of agricultural insurance sector with an extensive network of regional offices. This company insures a bigger part of livestock population in Ukraine; however, during the last 3 years its market position has been challenged by other insurers (Etalon, TAS, Credo-Classic, etc.). According to the insurers, livestock insurance occupies about 25-30% of the total agricultural insurance market. The biggest share of the livestock segment belongs to cattle insurance (65-75%) with pigs and poultry insurance splitting the rest of the market evenly (insurance premium basis). According to estimates, Ukrainian insurance companies insure about 200,000 cattle heads and 40,000 pigs. There is no reference information on poultry insurance volumes. The annual premium volume of livestock insurance is estimated at 20 million UAH (approximately 4 million US$).[39]

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[36] http://www.minagro.gov.ua/; http://www.mcx.ru/; Russian and Ukrainian media news

[37] http://www.rgs.ru/

[38] There is no public statistical information on livestock insurance in CIS countries. Information is based on the insurers' assessment provided during interviews. Data from Internet sources (http://www.allinsurance.ru/; http://www.insur-info.ru/; http://www.agroinsurance.com/ was also used.

[39] Assessment of the annual insurance volumes is based on information provided by the insurers during interviews and from tquestionnaires. Data from Internet sources (http://www.uainsur.com/; http://www.forinsurer.com/; http://www.agroinsurance.com/) was also used.

There are 32 insurance companies in Moldova but livestock insurance is offered by approximately 10 companies with two companies dominating the biggest share of the agricultural insurance market (Moldasig and Garantie). The insurance companies advised that the volume of the livestock insurance segment is very small and they have few contracts. At the same time it is interesting that the major reason for the farmers to purchase insurance coverage is risk management considerations but not collateral insurance as it is observed in other CIS countries.[40]

3.3.3. Epidemic livestock disease insurance products currently available[41]

The insurance companies offer similar livestock insurance products in CIS countries. They usually propose a multi-peril package that includes coverage against most livestock diseases. The clients can choose the risks to insure however the list of risks is often agreed or approved by the banks and financing institutions providing credits to farmers. The insurers divide risks into three groups – diseases, accidents and damage or loss due to third party actions.

The insurers use veterinarian standard descriptions (professional reference literature) of the risks/diseases for insurance purposes. The disease risk list usually includes Avian Influenza and FMD coverage as well as other epidemic diseases. Such products are offered in Russia and Moldova though the situation in Ukraine is different from other CIS countries. Some Ukrainian companies include epidemic diseases into risk list (Credo-Classic) but most insurers exclude Avian Influenza, FMD, Brucellosis, Tuberculosis, Leucosis and some other specific diseases (according to the type of animals) from the list of risks covered by the insurance contract. Epidemic diseases are included in the coverage only on products offered to private households and small farmers. Avian influenza is currently not insured by Belgosstrakh in Belarus.

Many insurance companies propose partial coverage (accidents and third party actions) and full coverage sub-products (including diseases). Additionally, the insurers designed separate insurance products for commercial farms and private households/private farmers. These products have slight differences and provide similar risk coverage for both groups of clients. The products for commercial farms provide more sophisticated underwriting procedures to address risk accumulation issues. The commercial product allows for adjustment of the contract terms according to the needs of commercial farms while the products for private households/private farmers are standard and cannot be changed by the agents and regional branches. Examples of standard products for households and private farmers are “Buryonka” designed by Rosgosstrakh (Russia) and “Hatynka-Tvarynka” by TAS (Ukraine).

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[40] Analysis of Moldova livestock insurance market is based on the information provided by Moldasig and Garantie insurance companies. Internet-based resources were also used. Not much information was available on livestock insurance in Belarus (http://www.belgosstrakh.by/; http://www.belbroker.com/) and Kazakhstan (http://www.minagri.kz; http://www.theeurasia.kz), although Internet-based resources indicate that this type of insurance is mostly offered by major local insurance companies (e.g., Belgosstrakh in Belarus). The web-site of Belgosstrakh insurance company stated that the company offers full risk coverage for livestock including epidemic diseases but does not insure poultry. The livestock insurance in Kazakhstan is at the same development level as in other CIS countries and description of the insurance programs provides the same information as can be found in Russia and Ukraine.

[41] This section of the report is based on information provided by the insurance companies during interviews and from the questionnaires filled in by seven insurance companies.

3.3.3.1. Product design

In all CIS countries the insurance companies must obtain a license for agricultural insurance (which is a mandatory programme) and for property insurance. The companies must provide standard "rules of insurance" which define the basic terms of insurance for all products offered by the insurer.

On livestock insurance products, insurers usually divide risks into three groups – accidents, diseases and unlawful actions of third parties (stealing, damage, intentional loss). The client can choose all three groups of risks for insurance or select a partial coverage. Epidemic diseases are included into disease groups that also includes poisoning, bites by insects, snakes and animals, etc. There are no separate products for epidemic disease insurance though according to the industry experts, some companies might offer special products if the client would request a specific insurance policy.

Many companies offer several options for the clients to choose full coverage, partial coverage without diseases and forced slaughter, and basic coverage (accidents). The clients can insure separate groups of animals or the whole livestock population at the farm. Some farms prefer to insure only pedigree animals to avoid loss of the most expensive assets.

The insurance companies in Russia and Moldova insure against all diseases that can cause loss of livestock. Rosgosstrakh (Russia) adjusted 5 cases of Avian Influenza and FMD in 2006. Insurance companies in Ukraine mostly exclude Avian Influenza, FMD, Brucellosis, Tuberculosis, Leucosis among others diseases from the coverage of their livestock products.

Livestock can be insured by any person (individual or legal) who can prove the ownership rights of the animals to be insured. Usually these are separate farms or households that sign the insurance policy. Cooperatives and associations are underdeveloped in CIS countries and they are mostly not participating in insurance contract procedures.

The insurance sum is established at the level of 75-80% of the market value of the livestock. CIS insurance companies apply non-conditional deductibles within the range of 5-35% from the insurance sum (the average is 15-20%) depending on the risk level of the client. The deductible can also be applied to each livestock unit according to the insurance contract.

Livestock insurance contracts are usually signed for one year. Some farms can insure shorter life-cycle livestock such as broiler chickens. In this case the contract can be concluded for 3 months. Insurers often provide minimum age restrictions for insurance of the livestock, for example: Cattle – from 1 month (Ukraine) to 6 months (Russia); Pigs – from 4 months; Sheep and goats – from 6 months (Russia) to 1 year (Ukraine); poultry – from 1 month (broilers) to 6 months (egg-layers). The insurers offer longer term contracts for the clients upon their demand. Usually 3-5 year contracts are purchased by the farms that imported pedigree livestock. Long-term contracts are also requested by the farms which have received long-term credits from banks and leasing companies.

The insurance contracts do not cover losses occurred if the client failed to take precautious measures, did not vaccinate livestock or caused loss intentionally. The insurers do not compensate losses if unattended livestock was killed by vehicles.

The insurers usually cover all direct losses. Some insurers (Ukraine) limit culling and rendering costs by 20-25% though this practice is not standard in Russia and Moldova where all direct losses include culling and rendering costs. Most Ukrainian insurance companies do not cover consequential losses. The insurers in Russia (most but not all), Moldova and Belarus cover all veterinarian costs, medicines, reduction of animal value, and loss of pedigree quality. Some insurance companies in Russia do not compensate consequential losses similar to their Ukrainian colleagues.

The loss sum is calculated on each livestock unit damaged or lost. In case several animals were killed, slaughtered or damaged, the total loss sum is calculated. The insurance companies usually do not impose payout limits (ceilings) on the farm, claim or insurance period. They pay out the loss sum subtracting the value of meat, hide or other assets suitable for consumption or for sale at the market.

3.3.3.2. Underwriting procedures

The insurance companies require all livestock to be subjected to annual or regular veterinarian checks and vaccination. Additionally, the insurers inspect the state of the livestock. The livestock in quarantine zones cannot be insured. The insurers might also refuse to insure the animals if they expect an epidemic disease outbreak (Avian Influenza in 2005 in Russia, Kazakhstan, Ukraine and Moldova).

It is standard for the insurance contract to come into force 10 days after the contract was signed. The animals reported as sick during this time-period are excluded from the livestock insured under the contract.

The farms usually must have all cattle identified (ear tags) and they might be requested to provide registration and veterinarian check documents. Insured farms are required to undertake all the necessary standard prevention measures. The contracts often have a provision that the client is obliged to report any unusual situations to the insurance company and they should follow the instructions provided by the representative of the insurance company. The farmer is required to have a health plan that can be checked by the insurance company.

The clients are required to complete extensive questionnaires prior to signing the insurance contract. The insurers are interested in their livestock management practice, feeding and vaccination issues, staff qualification, their supply of young animals, quality of buildings and security measures used, etc. The insurance companies require information on annual production and loss history.

Some insurance companies (Ukraine) do not visit holdings to inspect the livestock. They usually know the situation in the regions and rely on the agents' knowledge of the operational area.

The CIS insurers do not impose specific triggers to recognize the risk cases. Insured farms should report any case of livestock loss or damage be compensated. In case the veterinarian authorities declare quarantine due to a disease outbreak, the insurers would supervise the insured farms to control the outbreak of the disease and the state of the insured livestock.

3.3.3.3. Ratemaking procedures

Some insurance companies (Ukraine-Vip-Standard, Credo-Classic[42]) use their own epidemiological models. Most CIS companies in Russia, Ukraine and Moldova do not have the models. They use their historical records to adjust the premium rates. The insurance companies apply reinsurers' indicative rates and the premium basic rates of the former Gosstrakh insurance company (ex-USSR) for calculating their own rates. Rosgosstrakh is offering reinsurance capacity to CIS agricultural insurers and many companies apply the indicative reinsurance rates for setting their rates for clients. Rosgosstrakh itself reinsures its portfolio with premium groups of reinsurers (Swiss Re, Frankona Re, SCOR, etc.).[43] The insurers adjust premium rates annually. As a rule, the insurance companies can offer a 10-20% discount to loyal clients that insured their stock during the last 3-4 years.

3.3.3.4. Claim settlement procedures

The clients are required to report suspicion of a disease in a timely manner. Then insurers require a list of documents for the risk case to be accepted. Usually the most important document is the statement of the regional veterinarian office or Ministry of Emergencies that should record the loss or damage case and certify the cause of the risk.

The insurers adjust each risk event investigating the reasons of the livestock loss or damage. The veterinarian office must issue a regulation (direction) for forced animal slaughter otherwise the risk event or animal disposal would not be recognized by the insurer and indemnification would not be provided. The insurance contract regulates that the client is obliged to follow all instructions of the insurer. Failure to follow the instructions is treated as breakage of the contract terms by the client.

In case the farm is located in epidemic zone, the risk event is recognized automatically, but the farm still needs to provide the necessary documents. The household insurance products are usually more prone to losses due to a lower level of livestock management practice and basic technologies used. Moreover, some insurance companies experienced serious payout problems in the previous years when the meat prices went down and many clients managed to produce veterinarian reports of risk events fearing loss of profit due to lower prices.

Some insurance companies might compensate the market price losses if the prices go down. However such practice is not widespread and the insurers often remain with the insurance sum agreed when signing the contract. It is a regular practice to set the insurance sum per livestock unit at 70-80% of the market value. The insurance sum per livestock unit is different amongst the CIS countries. The table below provides the average value of livestock accepted for insurance (the value might change within different insurance companies; the table is constructed on the data provided by some insurance companies from Russia and Ukraine):

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[42] According to information provided in the questionnaires filled in by the insurance companies

[43] http://www.rgs.ru/

Table 4: Average value of livestock accepted for insurance

Livestock type	Russia		Ukraine	
	Value in RUR	Value in US$	Value in UAH	Value in US$
Cows (milking)	20,000	650	6,000	1,200
Cows and bulls (pedigree)	75,000	3,000	20,000	4,000
Pigs	4,500	180	2,000	400
Chicken	40	1.4	7 - 12	1.5 – 2.5

3.3.4. Strengths and Weaknesses of existing epidemic livestock disease insurance products

The current insurance products offer coverage for most types of livestock in CIS countries; however, the quality of the products is still not sufficient. The insurance products in Russia, Belarus and Moldova provide wide coverage against most risks including epidemic diseases. The insurance companies in Ukraine exclude some epidemic diseases (e.g., Avian Influenza, FMD) from the risk cover so insurance of epidemic diseases is limited in Ukraine. Only several insurers dare to offer epidemic disease insurance in Ukraine, though their services should be additionally assessed to understand the quality of the insurance services.

According to the insurers, livestock products have 30-35% loss ratio which is an acceptable performance. The products for private households and small farmers have a higher loss ratio (50-60%)[44] though they allow spreading risk coverage throughout big areas, which levels the loss ratio performance.

Insurers from Russia and Moldova consider livestock insurance products to be effective, though, considering the penetration rate (less than 3% in both countries)[45], such assessment should be accepted with caution. Ukrainian insurers considered livestock insurance products to have limited effectiveness considering that epidemic diseases were not insured in Ukraine (except by some companies).

The insurers were basically satisfied with the insurance products though they considered that the products should be modified and improved. Ukrainian insurers proposed to widen the insurance coverage and to improve the products' performance. Moldova insurers pointed out that livestock insurance was not widely used in their country (only several contracts were signed in 2005-2006) and they thought it would not be correct to evaluate the performance of insurance products based on these restricted indicators.

It is interesting that most insurance companies interviewed could not assess the level of satisfaction by the insured farms. Most of the experts checked "don't know" or "not satisfied" cells in the surveys that were circulated which presumes that the insurers might not know their market as they communicate with a limited number of potential clients.

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[44] According to the information provided by insurance companies from Russia and Ukraine

[45] Moldovan and Russian insurers indicated in interviews that they currently insure less than 3% of the livestock produced in their respective countries

The insurance companies are not working closely with the veterinarian authorities. The government-supported veterinarian programmes in all CIS countries do not involve the insurance community in risk management practices and these two systems exits parallel to each other.

The insurers lack reinsurance capacities. Ukrainian insurance companies reinsure livestock programmes in Russia, Rosgosstrakh being the main partner for insurers. Some risks are reinsured by Ukrainian insurers at the domestic market though this is currently not important while the number of contracts is minor. The restricted reinsurance capacity for Ukrainian insurers might be a greater problem when the market would accept bigger volumes of epidemic disease responsibility. The restricted reinsurance capacities in Russia (Rosgosstrakh) for smaller companies represents a serious problem for the future as well.

Insurance companies in Moldova reinsure their portfolio in the Romanian market as these countries currently have better relations and cultural ties than with CIS countries. The volume of livestock epidemic insurance is not big in Moldova so the insurers have no problems with reinsurance of small volumes. The situation might change in the future if livestock insurance would develop in Moldova.

3.3.5. Prospects for epidemic livestock disease insurance

All insurance companies interviewed considered that livestock insurance would develop in their countries. The insurers indicated that the commercial farms started to import pedigree animals for improvement of livestock genetics. Such tendency is recognized in all CIS countries. Another factor for livestock insurance could be the government support programmes on agricultural sector and livestock development. Such a programme has been started in Russia recently where over 52 thousand pedigree animals have been imported only for the national livestock project. Similar initiatives have been declared in Ukraine, Kazakhstan and Moldova.

The insurers indicate that more farms insure their livestock for risk management purposes and not for securing credits. This tendency is recognized in Moldova and Ukraine while most livestock insurance contracts in Russia are being signed for securing collateral property on bank credits.

All insurance experts from all CIS countries believed that government subsidies might stimulate livestock and crop insurance. Premium subsidies will make insurance less costly for farmers which could improve access to insurance services.

The governments of Russia, Kazakhstan, Ukraine and Moldova are subsidizing crop insurance programmes and the insurers expect similar initiatives to be developed for livestock insurance. Such initiatives fall within green and amber boxes of WTO support measures for agriculture and the insurers believe that the governments would recognize these opportunities.

The governments might assist insurance companies in the establishment of the reinsurance and/or catastrophic pools. Accumulation of the risks into national pools would help to effectively reinsure the national portfolio of livestock risks. This would allow offering wider epidemic coverage in CIS countries that should definitely stimulate development of livestock insurance programmes.

3.3.6. Country Background: Public and other compensation schemes for epidemic livestock diseases

All CIS countries have developed veterinarian systems for controlling livestock health. These systems originated from the ex-USSR veterinarian inspection. The veterinary inspections have staff and a regional networks of specialists to control the epidemics situation in the regions.

The veterinarian inspections are responsible for annual and regular livestock checks. The governments in all CIS countries subsidize veterinarian services in their countries (they fully cover operational costs of veterinary services and basic medicines). They also provide compensation payments for farmers and households for the animals that have to be slaughtered in the event of epidemic outbreak (Avian Influenza in 2005). According to public information, the governments of Russia and Ukraine compensated the cost of poultry that was slaughtered in 2005 due to Avian Influenza.

The decision on compensation payments has to be made by the central government of each country and the funds are usually coming from emergency reserves of the Cabinet of Ministers in each country. The governments do not plan livestock emergency expenses in annual budgets and the decision is made ad-hoc depending on the livestock epidemic situation in each country. The Russian Federation allocated 3 million US$ for the measures to combat Avian Influenza in their country during 2006-2008. Additionally, Russia will spend 1305.5 million RUR (45 million US$) in 2006 on the activities to limit Avian Influenza epidemics. From this money, Russia plans to spend 430 million RUR on production of the Avian Influenza vaccine, 200 million RUR on creating a store of vaccine for people working in epidemic areas and 242 million RUR will be used for creating a store of anti-viral medicines and poultry vaccination. Russia will purchase medical equipment for 128.7 million RUR for better monitoring and identification of epidemic cases. 73 million RUR will be directed for purchasing diagnosis equipment and prevention measures to control Avian Influenza in the Russian Federation.[46]

Ukraine allocated 39.5 million UAH (7.8 million US$) in the Fiscal Year 2007 budget for veterinarian purposes and disease epidemics prevention (16 million UAH or 3 million US$ were allocated in Ukraine for the same purposes in the 2006 state budget).[47]

The Ukrainian government tried to introduce a mandatory livestock insurance in 2002-2003 but that initiative was not well received by farmers and the government did not provide funds for premium subsidies. The farmers treated mandatory livestock insurance as additional tax and protested this programme. The other CIS countries did not have the similar programmes during 2000-2006.

The insurance companies require reports from the veterinarian service in case the animals were killed or should be slaughtered/disposed. All insurance specialists indicated a lack of cooperation between the state veterinarian services and insurance companies. The existing government livestock support programmes (ad-hoc payments) do not include involvement of insurance companies. The interviewed insurers could not provide basic data on livestock veterinarian programmes or ad-hoc payments, which confirms the lack of cooperation between the private insurance sector and national governments.

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[46] ITAR-TASS info, August 09; http://www.strana.ru/

[47] State Budget of Ukraine (2007), http://www.rada.gov.ua/

The veterinarian livestock programmes are managed by the Ministries of Agriculture with involvement of the Ministries of Emergencies and Veterinarian National Services (Inspections). These programmes do not involve private insurance companies and public information on veterinarian prevention activities (epidemic diseases) is limited. The insurers from all CIS countries indicated that they would like to see more cooperation with the government bodies on livestock insurance. The companies are ready to underwrite epidemic risks though they would expect subsidization of insurance premiums and closer cooperation / joint product design with the veterinarian services and other government institutions.

3.4. India

3.4.1. General information

India possesses one of the largest livestock populations in the world. According to the seventeenth Livestock Census conducted in 2003, India ranks first in cattle and buffalo population in the world (with 185 million cattle and 98 million buffaloes). Despite the low productivity of their animals, India is the largest producer of milk in the world.

Despite enormous economic losses arising out of various epidemic diseases to cattle and poultry the country does not have a national law to control infectious diseases in animals and birds. The government has introduced a bill[48] in Parliament called 'The Prevention and Control of Infectious and Contagious Diseases in Animals Bill' to prevent the spread of outbreaks across states and to meet international obligations for trade. Should this Bill be approved (it is currently under examination and awaiting clearance from the Government in Parliament),[49] it would generally cover not just cattle, buffalo, sheep and goat but also dogs, cats, horses, camels, mules, pigs, poultry and bees. In the statement of objects and reasons, the government acknowledges that its efforts to control major diseases like foot-and-mouth disease, haemorrhagic septicaemia and anthrax are constrained in the absence of a uniform legislation and these diseases still continue to be a serious threat to the livestock sector.

Realising the importance of animal husbandry sector to the Indian economy in general and the rural economy, in particular, the government of India has included Livestock Insurance in the Common Minimum Programme in 2003. *Epidemic* livestock insurance products are currently virtually unknown in the region; no insurance companies offer such products except for diseases that are preventable through vaccination and where the insurance cover is only extended to vaccinated animals. A few companies have in the past tried marketing epidemic livestock insurance products but due to a lack of demand, they were removed from the market.

This section is based on a survey of insurers providing livestock insurance products in India, as well as on communication with a significant number of insurance companies in the region, government organizations and academic institutions. Internet-based resources were also researched.

3.4.2. Market situation for livestock insurance

It is estimated that livestock and fisheries sections contribute approximately 6% to India's GDP, i.e. almost one fifth of India's GDP is originates from agriculture and related activities. About 19 million people work in the livestock sector. Equally important, livestock wealth in most cases is made up of "durable assets" which are relied upon not only to diversify their income sources but also assets to fall back on in bad times. In short livestock related activities not only augment rural income but also help to reduce the volatility of rural income.

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[48] Press Information Bureau, Government of India (2005)

[49] PRS Legislative Research (2006)

Recent trends in livestock population in the Indian Economy are based on the 1997 and 2003 livestock censuses conducted by the Department of Animal Husbandry and Dairying under the Ministry of Agriculture[50] (see Table 5):

Table 5: Livestock population in India (1997 and 2003)

Animals	1997 (in thousands)	2003 (in thousands)
Cattle	198,882	185,181
Buffaloes	89,918	97,922
Sheep	57494	61,469
Goats	122,721	124,358
Pigs	13,291	13,518
Horses and ponies	826	751
Mules	220	176
Donkeys	881	650
Camel	916	632
Yaks	177	65
Mithun	176	278
Poultry	347,611	489,012
Total	485,385	485,002

Source: Ministry of Agriculture, Department of Animal Husbandry Dairying and Fisheries, Government of India. And National Insurance Academy, Pune.

Additional to the direct output contribution of the livestock sector, the livestock sector plays an important role in many other sectors via contributions of its raw material by-products such as hides and skins, blood, bone, fat, etc. The value of output from the meat group was Rs. 2.93 billion in 2003-2004 (63.9 million US$).[51]

India has not been a significant exporter of livestock products. Livestock, poultry and related products earned Rs.47.34 billion (US$ 1.08 billion) in exports and leather accounted for Rs.25.68 billion (US$ 584.2 million)[52].

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[50] Ministry of Agriculture, Department of Animal Husbandry Dairying and Fisheries, Government of India

[51] Converted at 1 Rs. = 0.02182 US$ (2003-2004 average)

[52] Converted at 1 Rs. = 0.02275 US$ (2005 average)

There are eight non-life insurers offering livestock insurance in various forms in the Indian market place out of a total of 13 non-life insurers. Most public sector banks and cooperative banks have collaborated with insurers to offer livestock insurance to their customers in rural parts of the country. Insurance penetration for the year 2005 was 1.6% and insurance penetration of the breed-able population was 6.5%.[53] Livestock insurance figures can be seen in Table 6.

Table 6: Premium collected and animals insured in India over time (2001-2004)

Year	Total premium (in million Rs.)	Animals covered (in million)
2001	1,450	8.9
2002	1,340	9.2
2003	1,210	6.3
2004	1,100	6.7
2005	1,380	7.9

National Insurance Academy, Pune, India

In spite of a more than 30-year history of livestock insurance, the Indian experience has not been commendable. The main reason for this is that livestock insurance is not seen as an attractive business, neither from the viewpoint of the livestock owner nor from that of the insurance provider. From the viewpoint of the livestock owner, the causes for not buying insurance may be diverse, but from the viewpoint of the insurance provider the dominant cause is the absolute or relative lack of profitability of that line of business.

Loss ratios for livestock insurance in India are very high and are nearly unprofitable; the loss ratio has averaged 82% in the last 5 years (see Table 7). Considering up to 15% of premiums are paid as commission, and supposing remaining management expense to be 5% of premiums, then the loss ratio stands at just a little over 100%.[54] This may explain why there is no financial motivation from the insurance providers' side to expand the livestock insurance business.

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[53] National Insurance Academy, Pune

[54] Dr. K.C. Mishra, Director, National Insurance Academy, Pune

Table 7: Loss ratio of livestock insurance in India

Year	Number of animals covered	Premium	Amount of Claims Paid	Incurred Loss Ratio
	(in Million Rs.)	(in Million Rs.)	(in Million Rs.)	(%)
1997-98	6.3	1,440	800	56
1998-99	7.9	1,530	1,260	83
1999-00	9.8	1,370	1,140	83
2000-01	8.9	1,450	1,360	90.20
2001-02	9.1	1,340	1,070	79.41
2002-03	6.3	1,210	1,110	92.45
2003-04	6.7	1,090	960	83.41
2004-05	7.9	1,380	890	66.24

Source: National Insurance Academy[55]

3.4.3. Epidemic livestock disease insurance products currently available

The Indian market has livestock insurance products available by type of animals and not type of disease. Disease based loss control is made through backstop, stop-loss, exclusions and vaccination conditions, etc. Common exclusions are disability of any kind, disease contracted prior to and/or within 15 days of inception of risk, breeding and furrowing risks and immunizable disease covered only on successful vaccination. Diseases arising out of contagious infectious agents - viral, bacterial and protozoan parasitic - are generally excluded, except those that can be prevented by prophylactic vaccinations. Disease like Glanders, SA, HS, RP, Anthrax, FMD, BQ, Tetanus etc. are covered only if a successful vaccination certificate can be provided.

3.4.3.1. Obligation of policy holders

The policyholders are expected to have proper feeding of animals as per advice, proper management, timely deworming and vaccinations, timely reporting of ill health if any, presenting the animals for periodic check by the veterinarian, etc. The identity of insured animals is maintained with the help of ear tags, which need to be properly maintained by the cattle owner.

3.4.3.2. Product design

Livestock insurance schemes in India cover individual animal owners, private dairies, cooperative dairies and National Dairy Development Board (NDDB)[56] owned dairies. Milch cows[57] and buffaloes, calves/heifers, stud bulls, bullocks (castrated bulls) and castrated male buffaloes are covered. Animals within a specified age group are accepted under the Standard Insurance Scheme. The sum insured under the policy will be the market value of the animal. The basic premium rate per annum is in most cases 4% of the sum insured.[58] Long-term policies are also issued with long-term discounts. The premium rates under the policy allow for covering animals under government-subsidised schemes (see below). Group discounts are also available.

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[55] National Insurance Academy, in reference to the following insurers: New India Assurance, Oriental Insurance, United India Insurance, National Insurance (1997-1998 to 2002-2003); New India Assurance, Oriental Insurance, United India Insurance, National Insurance, Royal Sundaram Insurance, IFFCO-Tokio Insurance (2003-2004 to 2004-2005).

3.4.3.3. Underwriting procedures

There are various underwriting criteria / guidelines depending upon different types of livestock. The proposal is underwritten on the basis of scope of cover required, age, market value and sum insured of livestock. The cover includes standard exclusions (common & specific) and sometimes additional policy conditions like veterinary examination, etc.

3.4.3.4. Ratemaking procedures

Epidemiological models are not employed to determine premium rates in India. Rates are in most cases set under a market agreement that is dependent on past claim experience and on the prevalent diseases in the region.

3.4.3.5. Claim settlement procedures

In the event of death of an animal, immediate notification is to be given to the insurer. Death certificate, post mortem report from a qualified veterinarian and the claim form are to be submitted to the company along with the ear tag applied to the animal. The value of the animal is established according to the veterinarian's assessment of the age of the animal. After compliance of all the formalities, the claim is settled and the loss voucher issued on receipt of which a cheque is issued to the claimant. In case of a permanent total disability claim (PTD),[59] the company's liability is limited to 75% of the total sum insured if the cover has been taken. In case the animal is under the standard insurance scheme, the company does not insist for post mortem report and the claim is accepted with the death certificate jointly given by two local government officials. Claims within 15 days of insuring are not accepted.

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[56] The NDDB was created to promote, finance and support producer-owned and controlled organizations. NDDB's programmes and activities seek to strengthen farmer cooperatives and support national policies that are favourable to the growth of such institutions.

[57] Milch cows – cattle that are reared for their milk

[58] The four nationalised non-life insurers – New India Assurance, Oriental Insurance, United India Insurance & National Insurance charge 4% and the private companies also keep within that percentage.

[59] PTD – In the case that milch cattle result in permanent and total incapacity to conceive or yield milk; in the case that stud bulls result in permanent and total incapacity for breeding purpose; in case that bullocks, calves / heifers and castrated male buffaloes result in permanent and total incapacity for the purpose of use mentioned in the proposal form.

There is no maximum compensation per year or per single claim for livestock insurance in India. However, companies pay the claim for 100% of the sum insured in case of animals covered under a government sponsored scheme, and the sum insured or market value prior to illness (whichever is less), in the case of animals not covered under a government sponsored scheme. Cattle, sheep and goat insurance have no deductible[60] but covers for horse, pony, mule, donkey, pig, camel have a deductible.

3.4.4. Strengths and Weaknesses of existing epidemic livestock disease insurance products

The strength of existing epidemic livestock disease in India lies in animal-wise coverage insurance schemes irrespective of diseases but the disease should have immunization process in place. The weakness of this scheme lies in not covering or rather excluding pandemics whose immunization is yet unknown.

3.4.5. Prospects for epidemic livestock disease insurance

Livestock epidemic is covered in India as described above and is subject to immunization and backstop conditions. But pandemic (as a special case of epidemic) is yet not covered and there is no possibility to affect the cover due to very adverse loss ratios of livestock insurance at present.

Without pandemics coverage, the industry is far above the prudential loss ratio maximum of 70%; as such, the insurers have no incentive to enlarge the scope of coverage further without gross subsidization. The livestock insurance business in India thus far mostly belongs to the four public sector-undertaking insurers (PSUs).

Moreover, 22 out of 32 states and Union Territories of India are vulnerable to some disaster or other, which has the potential to cause large-scale death and destruction and also spread disease among the livestock population. Between 1953-1990 over 100,000 cattle were killed due to earthquakes and other natural calamities in India. Though animals are the main source of livelihood to the poor and the landless, concrete steps towards disaster management of livestock and other animals are yet to be taken in the country.

3.4.6. Country background: Public and other compensation schemes for epidemic livestock diseases

Immunizable epidemics are compensated by risk transfer process. Insurance of livestock operates with a low profile. Most epidemic losses are part mitigated by the government as relief. For example during recent outbreak of Avian Influenza requiring large scale poultry culling for safeguarding humans against disease, the government paid per bird compensation of Rs40.

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[60] No deductible is considered for cattle, sheep and goat as these species are particularly relevant for the livelihood of the rural population

The Government of India approved a 'Livestock insurance scheme'[61] that is being implemented as a pilot project in 100 selected districts during 2005-06 and 2006-07. The government has subsidised half of the premium that has to be paid, with the entire cost of the subsidy being borne by the Central Government. The government has, through this scheme, targeted insuring 1.5 million animals with an estimated expenditure of Rs 1.2 billion.

The premium subsidy was being restricted to two animals per beneficiary and will be given for one-time insurance of an animal up to three years. The scheme has been formulated with the twin objectives of providing protection to farmers and cattle rearers against any eventual loss of their animals due to death. It also seeks to demonstrate the benefits of the scheme to the people and popularise it with the ultimate goal of attaining qualitative improvement of livestock and their products.

The districts that have been selected are those where livestock is a potentially important source of income supplementation and where special efforts are being made to introduce crossbreed and high-yield cattle. Extension of the scheme during the 11th Five-year Plan will be considered after reviewing the performance of the scheme over the past two years. The insurance scheme will also be implemented through the Livestock Development Board in coordination with the Panchayati Raj institutions (decision making bodies in rural areas of the country).

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[61] Ministry of Agriculture, Department of Animal Husbandry, Dairying, and Fisheries, Government of India

3.5. China

3.5.1. General information

The survey of insurers active in livestock insurance in China was performed between January and February 2007. Agriculture insurance covering crop, livestock and aquaculture has never been profitable in China.[62] The People's Insurance Company of China (PICC) has scaled down its agriculture portfolio since its listing in the Hong Kong stock exchange in 1993. Chinese agricultural insurance business is generally not popular amongst the agriculture sector as most farms are family run and lacking in economies of scale and capital and technological inputs. On the average, farm earning is only RMB 2,600[63] per annum per family.

Premium rates are high as anti-selections and frauds are common in agriculture insurance. Frauds in agriculture insurance were reported to be 10% higher than property & casualty insurance business.

Since 2004, the China Insurance Regulatory Commission (CIRC) has worked closely with some provincial governments in carrying out agriculture insurance trials in order to formulate the appropriate compensation models that may be acceptable to farmers, insurers and both provincial and central governments. Agriculture premium was RMB 396 million in 2004, RMB 729 million in 2005 and RMB 846 million (US$ 108 million) in 2006.

A few new agriculture insurance companies were approved recently and this could be an early sign that the central government is determined to implement more agriculture insurance programmes throughout the nation in the very short run.

3.5.2. Overview of Chinese agriculture insurers

There are five Chinese insurers active in agricultural insurance. They are:

1. **Sunlight Agriculture Insurance Co (Formation in 2005)**

This agriculture mutual has a history dating back to 1991; it operates solely in Heilongjiang province, northeastern part of China. It has 9 branch offices, 105 regional mutual, and 2,000 local mutual with 200,000 members.[64] It was granted a national agriculture cum property & casualty license on January 11, 2005.

In 2006, Sunlight has received RMB 24 million and RMB 10 million subsidies from central and provincial governments.[65] Farmers enjoy a 20% subsidy from the government and 15% from farms owned by

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[62] Financial Times 20th September, 2006

[63] USD 1= RMB 7.76

[64] http://www.chinainsurance.com; (Xinhua News; Agriculture Insurance Benfits Farmers) 5th November, 2005

[65] http://www.chinainsurance.com; 8th September, 2006

Reclamation and Cultivation Area of Heilongjiang.[66] 10% of the premium is set aside in a catastrophe fund. Thirty percent of written premiums are retained by branch offices and a balance of 70% is kept by insurance associations. Insurance associations provide covers to members of mutual cooperatives. Currently insurance associations have 145,317 insured members. Insurance associations reinsure, on quotas-share basis, 50% of its business to Sunlight.

Insured crops are mainly rice, wheat, soybean, corn and barley. Cropping season is from May to Oct. Perils covered are drought, flood, water-log, hail, wind, frost, disease and insects. Drought, flood, water-log, hail are catastrophe perils in Heilongjiang. Sunlight needed reinsurance protection in providing such catastrophe covers. The mutual encountered severe drought loss in 1998.

Sunlight underwrote around RMB 230 million and RMB 300 million premiums in 2005 and 2006 respectively.[67] It provide covers for swine, dairy cattle and poultry on trial basis. Farmers pay RMB 180 for each insured dairy cattle whereas the provincial, city and district governments subsidised RMB 40 each.[68]

2. An Hua Agriculture Insurance Co. (Formation in Dec, 2004; Paid-up RMB 200 million; Strategic cum Commercial Agriculture Insurer; Owned by Jilin state enterprise)

This is the first commercial and multi-lines agricultural insurer in China. It has the license to operate throughout China but is currently more active in Jilin and Shandong provinces. It underwrites risks in direct proportion to the allocation of government premium subsidies. It is obliged to write at least 60% agriculture related business including crop, livestock, rural engineering projects, farm property and agriculture machinery.

An Hua writes selected livestock risks such as poultry, swine, beef and dairy cattle, goose, deer but its clients are mainly major agro-companies, cooperatives and contract farmers. Total premium income was RMB 55 million and RMB 248 million in 2005 and 2006 respectively.

3. China United (Formation in 1986)

China United is the country's fourth largest insurer with its headquarters based in Urumuqi, Xingjian province. It has the license to operate throughout China and its main shareholder is the Xingjian Army Corporation.

From 1986 to 1990, China United underwrote solely commercial agriculture insurance. In 1990, the company began to underwrite property and casualty business. With 35 branches and more than 10,000 staff, it underwrites an annual premium income of more than RMB10 billion. Agriculture business, however, represents a small fraction of its total premium income. 95% of the agriculture portfolio is underwritten in Xingjian province itself and this accounts for about 78% penetration rate of cropping projects managed by Xingjian Army Group. To avoid anti-selection, all livestock within the same county or project must be insured. Ear tagging and digital photos are kept to identify each insured dairy cattle.

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[66] http://www.chinainsurance.com; (Shanghai Security, First Mutuals, Premium Income Exceeded 200 Million) 26thMarch, 2006

[67] http://www.chinainsurance.com (Shanghai Security) 7th February, 2007

[68] http://www.chinainsurance.com (Suggestions For Development of Chinese Livestock Insurance) 29th April, 2006

Since 2005, CU began taking part in nation-wide crops and livestock insurance trials led by some provincial governments.

4. Shanghai Anxin Agriculture Insurance Co. (Formed in September, 2004. Paid-up RMB 200 million)

This insurer is owned by various Shanghai state enterprises, writing business within Shanghai City or for Shanghai investors with agriculture investments in the neighbouring provinces. Same as An Hua, Anxin is obliged to underwrite at least 60% of agriculture related business, including crop, livestock, rural engineering, farm property and agriculture machinery.

Anxin provides 'almost' full perils covers (except for drought as Shanghai is not susceptible to this condition) for crops, livestock and aquaculture. Most policies are marketed through 80 of the approximately 200 local farmers' cooperatives. One hundred percent of the rice growing areas and poultry farms plus 90% of the swine and dairy cattle farms within Shanghai city is insured with Anxin. They provide 65 types of agro-insurance policies, with crops, swine, dairy cattle, and poultry and 6 others being subsidised by the local government (subsidies ranging from 30% to 35%). In 2006, subsidy allocation from City and district finance departments was RM 32 million.[69]

Selected diseases including epidemic diseases such as Avian Influenza and FMD are provided as covers. Livestock risks are not reinsured as per event loss in agriculture portfolio above RMB 50 million and losses beyond company claims payment capability (after taking into consideration crop stop-loss treaty) are borne fully by the city government.[70]

Anxin has written RMB 132 million and RMB 163 million of agriculture and farm property business in 2005 and 2006 respectively. [71]

5. People's Insurance Company of China (formation in 1949)

PICC started writing agriculture insurance in 1982 after they resumed writing commercial insurance business; agricultural insurance was carried out partially on behalf of the government with the aim of providing covers to the farmers. Losses in agriculture business were usually cross-subsidized with profits from the property and casualty business. With commercialisation of PICC's operations (listing in the Hong Kong stock exchange) in 1993, agricultural insurance business was gradually reduced. Total agriculture premium income accounted only for 0.23% of PICC's overall income in 2004.

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[69] http://www.chinainsurance.com (Liberation Daily) 16th January, 2007

[70] http://www.chinainsurance.com (Eastern Morning daily) 10th October, 2006

[71] http://www.chinainsurance.com, 6th January, 2006 and (Shanghai Security) 7th February, 2007

Types of livestock insurance written are mainly beef or dairy cattle, swine and poultry. PICC does not insure small farms or family livestock except for crop and livestock farmers within trial projects and commercial farms with veterinarians (with the aim to minimise losses). Sum insured seldom exceeds 70% of purchase value so that farmers have the incentive to carry out loss mitigation and prevention. PICC also does not provide claim bonuses to farms with good records.

From 2005 onward, PICC has been involved in several livestock insurance trials, e.g.:

1) Inner Mongolia province: In 2005, PICC provided dairy cattle insurance for commercial dairy cattle farms. No government subsidy was involved. Sum insured ranged between RMB 7,000 to RMB 8,000 per animal with premiums between RMB 400 to RMB 500.[72] Due to the lack of subsidies, only 5,000 animals of the 2.51 million animals within Inner Mongolia were insured. In 2006, in another trial, farmers paid between RMB 150 to RMB 300 per insured animal, government subsidised RMB 50 and dairy processors contributed another RMB 50. [73]

2) Hunan province: Swine insurance; government provides 1/3 premium subsidy.

3) Sichuan province: Dairy cattle insurance; local government provides 1/3 premium subsidy, provincial government subsidies another 1/3 of the premium.

4) Shannxi province:Dairy Cattle insurance no government premium subsidy involved.

5) Shandong province: This trial project was launched in October 2006 with a premium subsidy provided by local government. Premium subsidies for dairy cattle is 40%, corn 50%, wheat 50%, vegetables 40%, etc. The trial involved coverage for 10,000 head of dairy cattle. Maximum indemnity for the whole trial project is 3 times the gross net premium income (GNPI). PICC is liable for the first 100% losses, and for additional losses above 100%, the indemnity is to be drawn from the catastrophe reserve fund. In the event that this fund is drained, PICC will be liable for an amount equal to 30% of the GNPI and the remaining losses will be borne by the provincial, city and district governments in the ratio of 3:3:4.[74]

6) Liaoning province: This trial project was launched in 2006 with a 100% premium subsidy provided by the local government for contract and integrated farms;[75] the subsidy is to be reduced to 60% in 2007 and 40% in 2008. This subsidy is provided only to dairy cattle, swine and poultry farms. The maximum indemnity for the whole trial project is 3 times the gross net premium income. PICC is liable for the first 100% losses and for additional losses above 100%, the indemnity to be drawn from the catastrophe reserve fund. In the event that this fund is drained, PICC will be liable for an amount equal to 30% of the gross net premium income and the remaining losses will be borne by provincial, city and county governments in a 3:3:4 proportion (up to a maximum indemnity of 3 times the gross net premium income). In August 2006, premium

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[72] http://www.chinainsurance.com 8th September, 2006

[73] http://www.chinainsurance.com 29th April, 2006

[74] http://www.chinainsurance.com (Jinan Times) 16th October, 2006

[75] Financial Times, 20th September, 2006

income has reached 1.096 million and loss ratio was 61%. Insured perils include epidemic diseases such as Avian Influenza and FMD. With livestock insurance as security, local agriculture cooperatives have provided RMB 480 million credit to some of the insured farms

7) Tibet province: This trial project was launched in November 2006 with a 90% premium subsidy provided by the local government. It involves crops, livestock and farm property.[76]

8) Gansu province: This trial project[77] was launched in August 2006 with a 50% premium subsidy provided by the local government. It involves crops, livestock and farm property. For cattle insurance, insured perils are compulsory slaughter, major diseases, fire, lightning, explosion, flood, breeding risks, etc. The sum insured ranges from RMB 1,000 to RMB 5,000 depending on the age of animals. The premium has ranged from RMB 20 to RMB 100 per animal. An additional feature is that an insured farm is entitled to a loan from a specific dairy cattle development fund set up by the City Finance Department. In 2006, Total Sum Insured (TSI) stood at RMB 5.065 million with 1,013 head of dairy cattle from 83 farms. Local dairy stocks stand at 43,000 head

9) Zhejiang Agriculture Pool: PICC is the leader of the Zhejiang Agriculture Pool with an 80% share of the Pool business. All insurers within Zhejiang province have to participate with a minimum share of 1% of the Pool business. Pool members have the opportunity to write other Zhejiang government related insurance business according to their share in the pool.

The Pool was established in 2006 on a 3-year trial basis involving P&C business, crops, livestock and aquaculture risks. Annual government premium subsidy to the pool is RMB 25 million. The Pool covers catastrophe losses such as typhoon, flood and drought for crops plus selected diseases and epidemic diseases for swine and poultry.

The maximum indemnity for any single year is 500% of gross net premium income GNPI. Losses within 200% are retained by the Pool; losses between 200% to 300% is borne by the Pool and provincial government with a 1:1 ratio, whereas losses between 300% to 500% are borne by the Pool and provincial government at a 1:2 ratio. Farms are first paid 50% of the payable claims during the year, if total losses exceeded 500% of GNPI, all claimants have to bear the reduction in payable claims proportionately so that total loss is capped at 500% GNPI.[78]

This Pool requires compulsory subsidies crop insurance cover where all farms within the trial area are automatically insured from 30% to 80% of the TSI without having to contribute to the premium. The farms can top-up the balance from 20% to 70% TSI with additional premium payment. Proposal for cover is based on county basis; all risks within a county must be submitted for insurance cover. The premium subsidy available for livestock is 60%.

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[76] http://www.chinainsurance.com, 17th November, 2006

[77] http://www.chinainsurance.com,21st November, 2006

[78] http://www.chinainsurance.com, 6th January and 15th March, 2006

For livestock covers, premium rate is 3% for poultry and the minimum population is 2,000 for layer or breeder birds and 8,000 for broiler birds. The premium rate is 5% for swine with a minimum population of 10 head for breeder sow and 200 head for porker.[79]

3.5.3. Market situation for livestock insurance

The market potential is huge but there is generally very low demand for livestock insurance as a majority of the livestock farms are small and cannot afford to pay the normal premium rate set by the commercial insurers. Insurers find it hard to secure quota share and stop-loss treaty support to write these sporadic family-run risks. Placement through facultative reinsurance is only possible for fairly large modern livestock farms. To date, only Zhejiang Pool has reinsured its livestock risks. A major portion of the livestock insurance premium comes from trial projects led by provincial governments.

It is common for insurers to keep a cap on the claims payable for livestock in any trial project, e.g. 3 times the gross net premium income; losses above this amount may or may not be borne by the provincial governments.

There is hardly any competition amongst agricultural insurers for crop, livestock, as well as aquaculture insurance business. In fact, it was because of the strong mandates from China Insurance Regulatory Commission that most agriculture insurers get involved in the provincial agriculture insurance trials.

3.5.4. Epidemic livestock disease insurance products currently available

3.5.4.1. Product design

Below are examples of the types of covers, exclusions, deductibles, terms and conditions provided in livestock insurance policies:

- Perils covered:
  - A. Basic covers

    Fire and lightning, explosion, drowning, attack by wild animals, falling of flying objects, collapse of permanent structure, collision within farm, falls from slope, electrocution, flood, hail, windstorm, heavy rainfall, cyclone and typhoon, attack by wild animals.
  - B. Breeding risks

    Death of animal caused by dystocia or death within 72 hours after giving birth.
  - C. Disease (certify by Veterinary department only)
    - I. Specify the type of diseases covered, e.g.
      - 1. Death or intentional slaughter due to:

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[79] http://www.chinainsurance.com, 6th December, 2005

        a. Brucellosis;
        b. Bovine Tuberculosis.
    2. Death due to:
        a. Traumatic recreticulitis;
        b. Traumatic pericarolitis.
    3. Intentional Slaughter order for animals with mastitis and endometritis (to be mutually agreed by both Insurer and Insured)
    4. Slaughter order caused by Foot and Mouth Disease only

II. Not specifying name of the diseases covered

Slaughter orders and loss resulting from all major diseases

Some policies do not provide clarity on the type of diseases insured so as to leave room for claims negotiations in the case where both insurer and insured dispute the amount of loss or admissibility of claims.

Generally, insurers are very selective in providing cover for compulsory government slaughter for epidemic diseases. For example, Anxin do provide such cover, as the municipality has agreed to reimburse Anxin in the event of lossess above company's claims payment capability or per event claims above 50 million.

China is free from contagious bovine pleuropneumonia (eradicated since 1996), rinderpest (eradicated since 1955), bovine spongiform encephalopathy, African horse sickness, African swine fever, Vascular stomatitis, skin diseases, Rift valley fever and Peste-des-petits Ruminants.[80]

- Exclusions are:
    1. War, terrorism, etc.;
    2. Theft;
    3. Heat wave;
    4. Poisoning;
    5. Slaughter order (common exclusions for insurers without livestock reinsurance treaty or financial backing of provincial government);
    6. Ill treatment of animals by insured and his family members;
    7. Non-adherence to vaccination programme;
    8. Collapse of cow sheds;
    9. Disease occurrence during waiting period;

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[80] All issues of Veterinary Bulletin, Ministry of Agriculture, China

10. Losses occurred outside the insured location;
11. Pollution;
12. Action of nuclear weapon, nuclear radiation, etc.;
13. Earthquake;
14. Natural mortality.

- Insurable age[81], e.g.:
    1. Swine – above 10 to 15 Kg up to 120 to 130 days fattening period (or 100 Kg weight);
    2. Breeder Swine – 1 or 2 months old to 3 years old;
    3. Dairy cattle – 18 months to 8 years old;
    4. Beef cattle – 1 to 6 or 7 years old;
    5. Poultry layer – pullet - day-old to 140; layer – 141 days to 500 days old;
    6. Poultry broiler – 10 to between 60 days to 90 days depending on type of bird.
- Waiting period, specifically for diseases and epidemic covers:
    1. Dairy and beef cattle - 15 days from inception for disease cover only;
    2. Poultry - 7 days from inception for disease cover only;
    3. Swine, rabbit – 10 days from inception for disease cover only.
- Period of Insurance:
    1. Dairy and beef cattle – annual policy;
    2. Swine - annual policy;
    3. Fattening cattle - 90, 120, 180 or 240 days short period policy;
    4. Poultry – annual policy.
- Sum Insured:
    1. Insured value is around 70% of the market value. For example, dairy cattle are insured at RMB 5,000 each if its market value is RMB 8,000;
    2. For fattening cattle, insured value is 70% of the market value plus feed cost for the whole fattening period;
    3. Expenses for disposal of carcass is indemnified only disease stricken animals.
- Deductibles, some examples:

I. Annual aggregate, usually for commercial farms:

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[81] The term "insurable age" refers to the age of the animal insured. Animals with a lower age than the minimum insurable age or a higher age than the maximum insurable age are excluded from coverage.

1. Total Loss, e.g.

Deductible for total loss: 10 % of total loss. For slaughter order caused by Foot and Mouth Disease, any government compensation is to be deducted from the claims payable and the maximum indemnity is fixed at 50 % of the total loss.

2. Partial Loss, e.g.

Annual aggregate deductible of 10 animals per annum for all insured perils except slaughter order (which is always a total loss); for all losses above 10 head, the deductible is RMB 5,000 per head for all perils except for intentional slaughter order due to mastitis and endometritis where no deductible is applied but maximum indemnity is set at RMB 6,000 per animal.

II. Each and every loss (E.E.L) deductibles are generally applied to family-run farms:

1. 5% deductible E.E.L in case of poultry diseases, all losses within consecutive period of 7 days is counted as EEL for poultry diseases;
2. 30% deductible EEL for dairy cattle in case of accidental perils such as electrocution, drowning, and falling from slope;
3. 50% for intentional slaughter;
4. Maximum indemnity of 60% of sum insured per animal for specific perils.

- Cancellation:

Normally policies are issued with non-cancellation clause.

M.O.F, M.O.A and CIRC are currently carrying out joint reviews of existing policy wordings and will submit their proposed standard wordings to the State Council for approval, most likely before mid-2007.[82]

3.5.4.2. Underwriting procedures

Since agriculture insurance has seldom been profitable for insurers, management generally pays more attention to underwriting procedures of agriculture risk as compared to P&C risks. In fact, most insurers prefer not to write agriculture business whenever possible. Underwriting is usually done by agriculture underwriters in the head office as branch personal often lack technical expertise to deal with the complexity of this class of business.

Government policy, price of raw materials, supply and demand, occurrence of epidemic diseases, fluctuation in livestock market price are being taken into consideration when setting the sum insured in order to avoid over insurance and possible frauds.

Acceptance criteria are generally as follows:

- Health inspection of each animal proposed for insurance by qualified veterinarian;
- Animals must have record of proper vaccination programme;

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[82] Shanghai Security, 7th February, 2007

- Photograph of owners with each dairy cattle for identification purpose;
- Animals from non-epidemic zone;
- Animals from area outside flood-prone zone;
- Breed or species which is suitable for the purpose of its production, such as meat, milk, eggs, etc.;
- All animals within farm must be proposed for insurance cover;
- Ear tagging and proper records such as date of purchase, sale, death, etc.;
- Routine animal health check by qualified veterinarian;
- No movement of animals between farms without agreement of the insurer;
- Minimum number of animals per farm to qualify for insurance cover, e.g. 2,000 birds for poultry, 200 head for cattle, etc.;
- The breed or type of animal or bird proposed for insurance has been reared in the location for at least a year.

Insurers conduct a stringent screening process for all insurance proposals in order to minimise anti-selection and any feasible opportunities for the insured to make fraudulent claims.

3.5.4.3. Ratemaking procedures

Premium rate is generally determined by historical loss results which are indirectly influenced by the insurers’ ability to curb anti-selection and frauds. Premium rates for each policy vary with the type of perils covered, total numbers of animals insured in a county or trial project, distance from the nearest branch office since it has bearing on pre-acceptance survey cost and loss adjustment cost, whether vaccination is provided or not (one insurer provides free vaccination to all insured animals), etc. More often than not, premium rates are negotiated between the insurer and the party involved such as producer associations, district government representatives, organising committee of provincial agriculture insurance trial, commercial farm, livestock integrated farm, etc.

New agriculture insurers usually make references to policy designs as well as premium rates set by PICC. Premium rates for small dairy cattle farms generally ranged from 3% to 10%. Commercial cattle farms, with their modern farming facilities, high standard of sanitation and proper vaccination programme, are normally charged from 0.8% to 2%. Swine porker farms pay from 5% to 8% depending on loss history, whereas poultry broiler farms pay around 0.8% to 1.5% for each batch of production.

Premium rates are normally divided into rates for basic cover (accidents/weather perils) and extension cover (disease/slaughter order).

3.5.4.4. Claim settlement procedures

It is a pre-requisite for claims admissions that loss should be notified immediately. Loss adjustment is usually carried out within 24 hours by loss adjusters or underwriters from the insurance company. There is no independent loss-adjusting firm that deals with livestock loss adjustment in China. Loss adjusters will usually seek out clues whether such loss is caused by mismanagement, non-adherence to pre-agreed vaccination programme, or carelessness of the insured or perils excluded in the wordings.

For dairy cattle, each dead animal must be identified by an accompanying ear tag and matching it against the photograph taken during the pre-acceptance survey in order to avoid fraudulent claims (e.g. submitting claims twice with the same carcass, dead animal was not previously insured, etc.). The exact date and time of loss must be determined and recorded as it is important for computation of EEL.

The numbers of dead animals/birds and weight of loss must be recorded precisely. There are usually three ways to determine the value of loss. The first method is by taking the total weights of the dead animals or birds and measure them against a preset loss settlement scale There is a cap to the maximum insurable weight of animals; for example, the maximum weight to be indemnified is 100kg for swine porker. The second method is by pre-agreed indemnity value (not in direct proportion to increases of feed cost with time, etc.) for a pre-agreed age group and the third is by the pre-agreed percentage of sum insured for the pre-determined age group.

Loss record is then checked against the number of animals or birds insured; if the farm is found to be under insured, an average shall be applied.

In case of poultry loss adjustment, normal mortality shall first be deducted from the loss before applying the normal deductibles. Any salvage is to be deducted from the claims.

In Heilongjiang, the mutual cooperative utilises two or three tier claims checks and approvals before payment are made. Claims authorities differ among the branch manager, claims manager and general manager. All losses, loss adjustment results and claims payable are displayed on the cooperative notice board and are open to every member in order to minimise fraudulent claims. Claims can only be paid if no objection is received within two weeks after public display. Fraudulent claims are not uncommon amongst small livestock risks. Small loss with high frequency and high loss adjustment cost are some of the challenges faced by the insurers.

It is a normal practice for most insurers and the insured to negotiate openly in the event of any kind of disagreement on loss adjustment or claims payment.

3.5.5. Strengths and Weaknesses of existing livestock disease insurance products

1. Breadth of coverage

Livestock policy in China could not fully satisfy the needs of farming community due to the following deficits:

- Low numbers of sum insured as compare to actual production cost, purchase price or market value at time of loss; sum insured is usually at not more than 70% of the actual value;
- High deductibles, ranging from 30% to 50% (slaughter order), except for poultry which is about 5% of Total Sum Insured (TSI);
- Insured is usually not allowed to cancel policy; in cases where cancellation is permitted, premium is usually not refundable;

- Policy is normally sold only to groups of livestock farmers instead of individual, non-commercial farms;
- High premium rates of 3% to 10% for selected covers;
- Inadequate covers, full risk mortality covers for death due to accident or diseases is uncommon in China. Covers are usually limited with named diseases plus one or two extended epidemic diseases;
- Policy terms and conditions are less flexible;
- For slaughter order, livestock farmers normally pay full premium for 100% sum insured even though indemnity may be pre-set at a 60% limit;
- Single animal policy is uncommon in China.

Livestock farmers are usually not given the choice to freely select the type of covers they wish to have; the covers are normally offered as they are and the livestock owners just have the option either to purchase it as is or not at all. Farmers in most trial projects are willing to purchase these covers since they are provided with a 60% to 80% premium subsidy. Generally farmers outside these trial areas do not purchase any form of covers.

2. Operational effectiveness

Beside government trial projects, livestock policies are usually sold through the following channels:

- Insurance agents;
- Producer associations or cooperatives;
- Credit department of financial institutions;
- Veterinary department;
- Brokers.

High agency commissions, pre-acceptance survey cost, loss adjustment cost, overheads, operational cost, etc has prevented insurers from making reasonable profits once the loss ratio gets close to 70%.

3. Financial performance

Given the scenario of sporadic small scale farming, local insurers have tried their best to balance their book of livestock business in the past years.

On average, loss ratios fall between 55% and 70%, with occasional much worse results on few bad years.

Level of satisfaction of both insurers and insured stakeholders

Generally, the Chinese insurers are trying their best to provide adequate covers to small livestock farms that survive on marginal profit. The current modus operandi for these insurers is to cross subsidies their loss in crop, livestock and aquaculture portfolio with profit from P&C business within the trial projects. Livestock farmers are willing to purchase the covers provided as long as the government is able to subsidise more than 50% of the premium. Comparing this to livestock farms located outside the current trial project area, farmers insured are more than happy to take part in the subsidised programme even though it does not provide full protections or compensation in full either on market value, production cost or purchase price.

Insurers on the other hand are willing to provide limited livestock covers if there is a preset limit on maximum indemnity to be provided in a given year, e.g. 3 times of GNPI for any trial project. Chances are these insurers are able to cross-subsidise losses from crop, livestock and aquaculture risks with profit from P&C business.

Prospects for epidemic livestock disease insurance

The government plans to increase the amount of premium subsidy allocation to the agriculture sector. A proposal was made in recent high-level meetings for central, provincial governments and farmers to share the premium in the proportion of 4:4:2 for selected crops, livestock insurance programmes in the near future.[83]

Given the large population numbers of livestock in China, the potential for livestock epidemic disease insurance is good. There are close to 500 million head of swine, 160 million head of cattle and 370 million head of goat and sheep in the country. Annual production of poultry meat, eggs and milk produce are 13 million tonnes, 27 million tonnes and 23 million tonnes respectively.

The Chinese government has vowed to improve the annual income of 230 million farming families. The annual agriculture premium in 2006 was US$ 108 million, farming families account for nearly a billion (79% of the 1.3 billion) of the total population. Implementation of agriculture insurance has been set as one of the important goals for the government since 2004. All agencies and ministries involved in implementation of agriculture insurance such as M.O.A, M.O.F, State Council and CIRC have held several meetings this year to discuss ways to expedite growth in agriculture insurance.

In 2002, mortality of swine due to natural calamities and diseases was 6.6 million head with another 850,000 head destroyed by slaughter order; for cattle it was 210,000 head for normal mortality and 130,000 head slaughtered by slaughter order; and for goat and sheep, the figures were 660,000 head for mortality plus 420,000 head slaughtered by slaughter order.[84] Demand potential for livestock epidemic covers could be huge in the future given China's high economic growth, which in turn has resulted in greater demand for high quality meat, egg, milk and fish products.

However, given the current trend in premium growth, it is envisaged that agriculture insurance will only grow in proportion to the amount of subsidy allocation from central, provincial as well as district governments. Insurers would not want to jeopardise their own well being or survival by providing natural catastrophe, epidemic diseases and slaughter order covers unless these are reinsured fully or there are adequate financial guarantees from governments to pay for all losses beyond their reserve for this class of business.

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[83] http://www.chinainsurance.com (21st Century Economic Report) 20th January, 2007

[84] http://www.chinainsurance.com, 29th April, 2006

3.5.6. Country Background: Public and other compensation schemes for epidemic livestock diseases

The government may or may not pay compensation for slaughter orders issued to any livestock farm. The decision to compensate depends greatly on the financial capability of the provincial governments, the scale of the epidemic or outbreak of diseases, the economic importance of such livestock, etc. The larger the scale of epidemic outbreaks, the greater is the chance of farmers getting compensation. Compensation varies between provincial governments and among different livestock species and breeds. The level of compensation is never fixed but generally compensation is around RMB 10 for each poultry bird, RMB 3,000 to 5,000 for dairy cattle and RMB 100 to 200 for sheep or goat.

There is no other form of compensation other than the public compensation described above for epidemic diseases, and rather limited and localised provision of slaughter insurance for epidemic diseases by insurers, as outlined above.

3.6. Other markets

3.6.1. Uganda[85]

Lion Assurance, an insurance company in Uganda, derives much of their expertise from their parent company in Zimbabwe and Botswana; they have taken most of the products offered in these countries and implemented them in Uganda for bovine livestock owners. Their livestock products cover risks related to livestock mortality and emergency slaughter on medical grounds. However, certain diseases are excluded, namely: Tuberculosis, horse-sickness, redwater or gall sickness, FMD in the western region, and AI. Epidemic diseases are specifically excluded however since the beginning of 2006, Lion Assurance has begun to offer a product for FMD for livestock owners in the Northern part of the country. This has only been issued with a small number of livestock owners, but has been implemented under the initiative of the East African Development Bank, which requires that farmers secure insurance against FMD on their livestock before they can receive a loan. Consequently, the East African Development Bank is better able to protect the loans they give to these farmers. This is will not be available throughout the whole country, as the western side is currently under quarantine due to a high prevalence of FMD. This FMD product is currently re-insured by Munich Re. For their other livestock products, there is no re-insurance market in Uganda; their livestock products are currently re-insured by companies in Kenya, Zimbabwe, Nigeria and South Africa.

In Uganda, Lion Assurance anticipates a demand for epidemic livestock disease products for bovine species, especially considering recent outbreaks of FMD in the western region where farmers have reportedly been suffering from high losses without insurance. Mr. Daka from Lion Assurance predicted that the best way to promote the development of such epidemic livestock disease products would be to promote higher bio-security standards at the government level so that it would be easier for insurance companies to enter areas when they know the farmers operate their farms adequately in order to prevent disease outbreaks. Once this can occur, the government should support insurance products for epidemic livestock disease by subsidizing premiums, which can be quite prohibitive. He anticipates that a global programme would be useful to engage the relevant national ministries and encourage their support for these insurance products. Theoretically, this would promote a larger pool of livestock farmers, thereby making these products insurable.

3.6.2. Chile[86]

The Asociación de Aseguradores de Chile reported that there are no livestock related products with the exception of two coverages existing for cattle, one against fire in stables and the other against losses due to land transport. These coverages specifically exclude epidemic diseases. There is no perception of a growth segment for epidemic livestock disease insurance in terms of future development for insurance companies in Chile, as the potential market for such products is rather small; agriculture is only about 5% of the country's GDP. The required premium would consequently be relatively high and restrictive. The main barrier to the development of such products is that a culture of insurance is not currently common in Chile and subsequently, there are no incentives to develop the insurance. They also cited very high costs to develop these programmes as prohibitive to the introduction of epidemic livestock disease products.

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[85] This section is based on a questionnaire and an interview on December 18, 2006 with Munyaradzi Daka of Lion Assurance, Uganda

[86] This section is based on a questionnaire provided by Asociación de Aseguradores de Chile

3.6.3. Argentina[87]

Insurance cover for livestock related risks is available in Argentina covering accidental death, loss of reproductive functions, and death or incapacity during transport. Diseases are also integrated in this cover, as well as epidemic livestock diseases. Diseases covered include Bovine Viral Diarrhoea (BVD), Infectious Bovine Rhinotracheitis (IBR), Parainfluenza (PI3), Haemophilus somnus, Enterotoxemias and Anthrax. Only a few epidemic diseases are specifically excluded such as: Bovine spongiform encephalopathy, Mastitis, and FMD. Sancor Cooperativa de Seguros Limitada insurance company operating in Argentina has excluded diseases such as FMD, which are subject to the official government policy of compulsory slaughter; then they consider the government responsible for the losses.

Two insurers cover epidemic livestock diseases in Argentina. These companies do not use a specific definition of epidemic diseases within the conditions of their policy. Sancor Cooperativa de Seguros Limitada insurance company collected US$ 19,700 in 2005 as their total premium income received for epidemic livestock disease cover. These products are reinsured by Munich Re. Cover for epidemic diseases is systematically offered with non-specialised covers for livestock and cannot be purchased as a supplementary or separate cover. These livestock insurance products do involve a deductible. It is offered only to individual livestock owners on an annual basis.

Direct losses included in the cover include the value of the cattle as it is declared in the policy and some consequential losses are also compensated for loss of production of milk animals that have been killed. Loss of milk production is calculated based on the average litres of production per animal per day and multiplied over 60 days. There is no maximum compensation limit. Livestock owners are required to follow specific prevention measures but are not subject to further obligations. Underwriting procedures for these products involve an obligatory inspection of the farm. No epidemiological models are used.

The government does not provide support to private epidemic livestock diseases insurance nor do they require livestock owners to take out livestock insurance. The government has also not provided ad-hoc compensation for epidemic diseases during the period from 2000-2005.

Sancor Cooperativa de Seguros Limitada indicated that there is presently no demand for epidemic livestock disease insurance that was not already satisfied. FMD was considered to be a disease product that is uninsurable. They also indicated that they did not consider epidemic livestock disease insurance to be a growth segment in terms of future development for insurance companies due to a lack of interest and a lack of a culture of insurance. However, they did indicate that appropriate public measures to encourage the development of this market segment would be to present such products and promote them.

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[87] This section based on a questionnaire provided by Sancor Cooperativa de Seguros Limitada, Argentina

3.6.4. Korea[88]

The Korean agricultural insurance market is organised nearly entirely under a mutual farmers' cooperative, the National Agricultural Cooperative Federation (NACF), and most of their work is operated through local brokers. They offer livestock related risk products covering accidental death (including non-epidemic disease), emergency slaughter, and sterility mainly resulting from natural catastrophes. Only non-epidemic diseases for pigs are covered, including Transmissible Gastroenteritis (TGE virus), Porcine Epidemic Diarrhoea (PED) virus, and Rota virus. Much of the direct losses are covered and even consequential losses are covered for business interruption. All epidemic diseases are explicitly excluded.

In the event of an epidemic livestock disease, the government compensation scheme in Korea is the only source of compensation for livestock owners' losses. This compensation scheme, the "Livestock Epidemic Disease Precautionary Code", allows for financial reimbursement of losses to livestock owners of diseases that are classified under OIE Lists A and B. The extent of government compensation is scaled depending on how many of their pre-defined 5 criteria have been implemented on the farm (criteria such as vaccinations, check-ups, and other loss prevention measures); if all 5 have been implemented, livestock owners are compensated 100%, if 4 criteria has been implemented they are compensated 80%, and then the level of compensation is further scaled down to 60%, 40%, and 20% for 3 criteria, 2 criteria and 1 criterion respectively.

Munich Re, operating in Korea, perceives a demand for epidemic livestock disease by the private sector. The governmental compensation scheme is the farmer's sole source of reparation following an outbreak of epidemic disease. As sometimes they are not fully compensated (depending on the degree to which these 5 veterinary and bio-security standards have been implemented), Munich Re perceives that the private sector naturally would demand a cover for epidemic livestock disease. Barriers identified were a lack of support in the reinsurance market. Munich Re, Hanover Re, and Swiss Re are all active in Korea for various other products and all reinsurance companies have, for the time being, excluded coverage of epidemics as no company has yet calculated the cost this risk would entail should the scope of coverage be extended to include epidemic livestock diseases. It is estimated that the premiums for this coverage could be prohibitively high unless it was subsidised by the government (during the interview it was estimated between 30% to 50% subsidies would be necessary). Insurance brokers also do not show any desire to enter this market as they also have not calculated the risk and, additionally, they have no risk appetite since there is no reinsurance market to protect them from the potentially high and volatile losses often associated with epidemic diseases. Finally, because the government has not been explicit about whether they would provide subsidies for such a product, the insurers cannot be certain that they will have a market demographic who could afford to purchase such a product. On the other hand, it was reported that other common barriers expressed by other developing nations are not a problem in Korea; Korea has well-developed veterinary services (i.e., with standard practices such as mandatory vaccination, registration of all livestock, labelling of all livestock, etc.) as well as detailed statistics collected by the government on outbreaks which could be useful for calculating risks later and strict import policies to prevent the spread of disease among other good practices.

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[88] This section based on a questionnaire and an interview on December 12, 2006 with Thomas Farny, Randy Hong, and Ike Kim of Munich Re, Korea

Munich Re has estimated that the government could encourage the development of epidemic livestock disease products in the private insurance sector if they offered to subsidise the premium for the individual farmers and also provide the reinsurance to protect the insurance companies over the loss capacity of the companies. On a global level, it was anticipated that an international reinsurance pool could be a useful tool to support these programmes in order to share the burden of disease costs; however, Munich Re questioned the effectiveness this pool would have on a practical level when such a pool would be subject to political factors as well as regional disease and risk differences. Therefore, a large reinsurance pool was considered more reasonable at the national level and the international level may be better situated to encourage risk prevention measures (such as the development of veterinary services, etc) and allow national solutions to address the real risk coverage and payments after an outbreak.

3.6.5. Thailand

Insurance is relatively undeveloped in Thailand for the livestock industry. In the past, there was only one company which used to underwrite dairy cows but this products has since been discontinued. Reasons cited were due to its poor underwriting results as well as the high administrative costs experienced by this company when operating this product.[89] There was, however, a discussion in 2005 on setting up a livestock insurance scheme for 1 million cows through a pool of insurance companies but that scheme was imposed on the companies by the ex-government and further progress or implementation has not occurred to date under the new government.[90]

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[89] Email communication with Thanad Jeerachaipaisarn of the Thai General Insurance Association, November 15, 2006

[90] E-mail communication

3.7. Conclusions: Strengths and weaknesses of existing products

Problems where products are not available

Epidemic livestock disease insurance products are not commonly offered in many parts of the world. Coverage ranges from relatively widespread in regions such as Europe to virtually nonexistent in, for example, many parts of Africa or Asian countries. This is also illustrated by the responses to our survey of insurers active in agricultural insurance, that was circulated widely but where responses were only received from the following countries: Germany, Switzerland, Greece, Netherlands, Spain, Korea, Uganda, UK, China, Thailand, USA, Ukraine, Russia, Israel, Sweden, Chile, and Argentina. However, when taking into account the low level of development of the livestock insurance market, the total number of responses (30) is quite satisfactory and can be expected to provide a rather good picture of the sector.[91]

Regions with more developed veterinary services, as well as more developed countries, have higher coverage of epidemic livestock disease insurance, as in the case for many countries in the European region. However, this is not always the case, only a few companies in the United States offer epidemic livestock disease coverage. It is often reported that demand for coverage is rather volatile depending on frequency of disease outbreaks. Regions without coverage of epidemic livestock disease most often are countries with limited infrastructure (veterinary as well as other general public infrastructure). However, even in such situations, sometimes products are offered; Zimbabwe and Botswana offer limited epidemic disease coverage (mostly for bovine species)[92] and a small number of farmers have received coverage for FMD in Uganda in areas that not suffering from a recent outbreak[93].

There are several factors influencing whether products for epidemic disease insurance are available. Important factors include the state of the veterinary infrastructure and disease status within the region. Another factor is the technical and financial capacity of the insurers operating within a country. Insurers perceive epidemic livestock disease insurance as a risky product that could jeopardise their profitability. Additionally, many re-insurers also lack motivation to move into countries where local insurers operate with limited capacity as the statistics necessary to calculate their risk portfolio is often not available in many countries. As such, lack of insurer capacity and re-insurer capacity are, in many countries, closely related barriers to the development of epidemic livestock disease insurance products.

A major obstacle to development of these products is also a lack of demand. In many countries, epidemic livestock disease is only offered as an separate, supplementary product which may be purchased in addition to general livestock disease coverage; in countries which do not suffer from frequent epidemic diseases, as in the US example, farmers are not willing to pay extra for coverage of a low-probability risk. In other countries a lack of financial capacity for farmers inhibits the demand for such products. For this reasons, and because risk adjusted premiums can be prohibitively high, in some cases government subsidises insurance premiums, such as in Spain or China.

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[91] The number of responses per country is provided in section 2 of this report

[92] Personal interview with Munyaradzi Daka of Lion Assurance Uganda on 18th December 2006

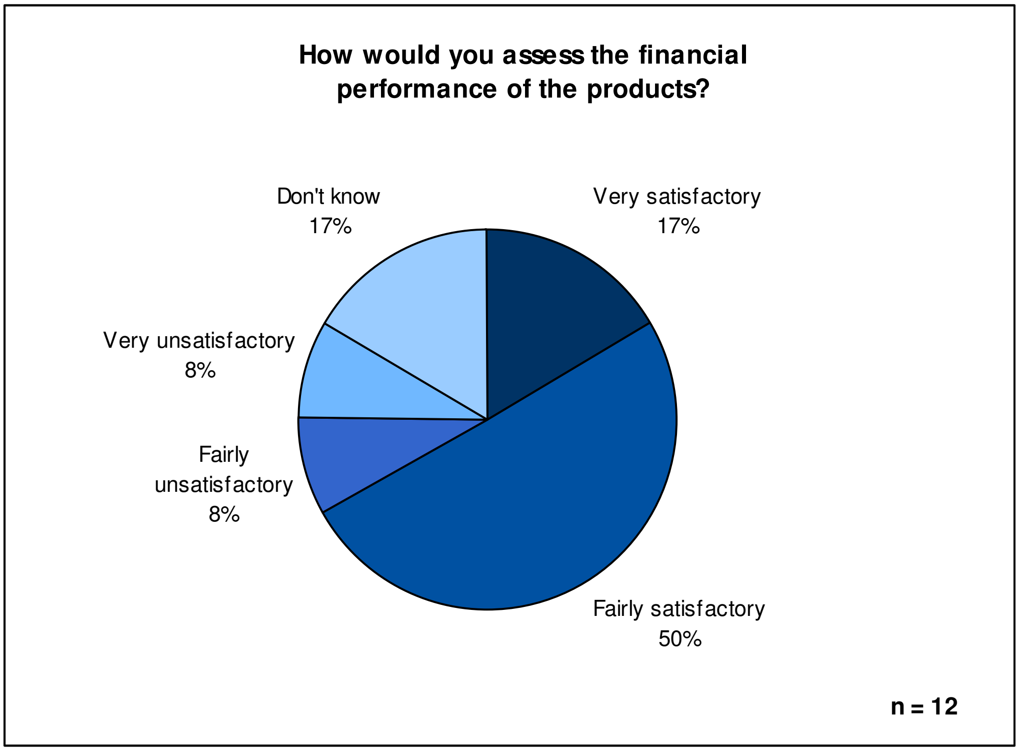
[93] Ibid

Additionally, as losses from a disease outbreak are strongly dependent on government intervention, re-insurers have stated that epidemic livestock disease products only seem feasible once some form of government compensation scheme also creates a liability for the government, thereby assuring that the government will not irresponsibly implementing disease control and prevention policies without taking into consideration related costs. Regarding the government's role, it appears that ad-hoc compensation and a lack of a compensation scheme is a limiting factor to the development of these products.

Strengths and weaknesses (where products are already available)

In countries where epidemic livestock disease insurance exists, the products are often reported as performing fairly or even very satisfactorily (in 67% of responses received to the survey of insurers):

Figure 1: Financial performance of epidemic livestock disease insurance products



Source: Civic Consulting survey of livestock insurers

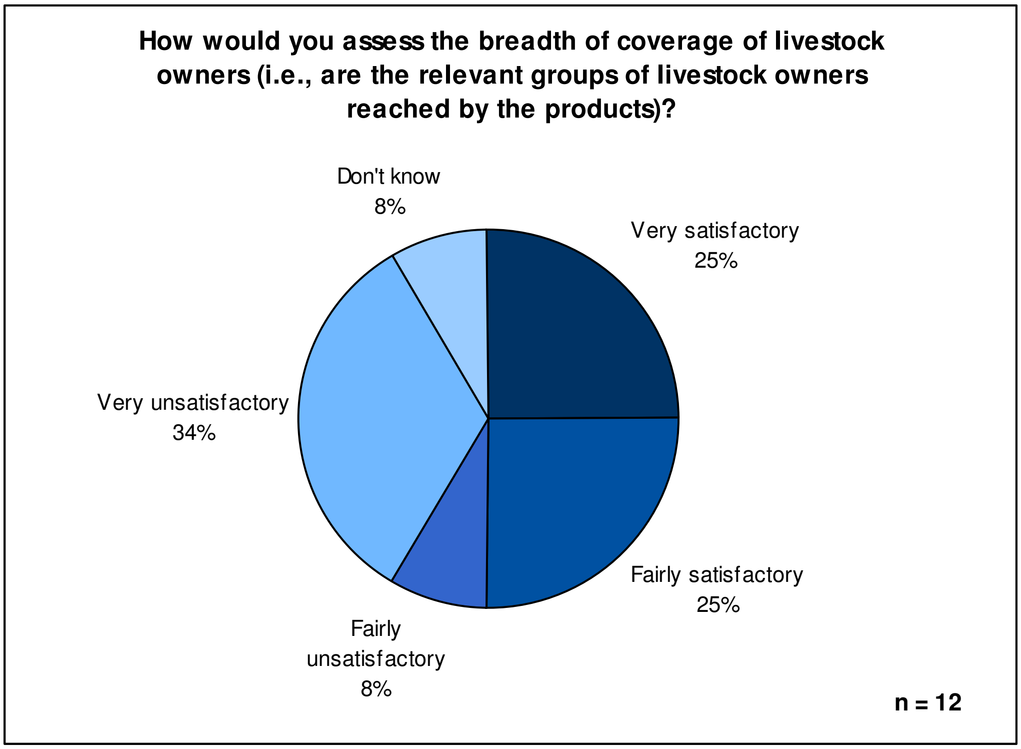
Insurers from Korea and Ukraine reported that they were very unsatisfied with the financial performance of their products, whereas insurers from countries with a higher level of economic development, e.g. in Europe, indicated higher levels of satisfaction.

Most epidemic livestock disease products offered are tied to good bio-security standards in their country of operation and indemnification is in many cases not awarded when it appears as if the owner has been at fault of poor practices. Consequently, especially in countries where in general bio-security standards are relatively low, insurance cover can provides incentives at the farm level that could lead to less frequent outbreaks and help to contain them.

One critical limitation in countries where epidemic livestock disease insurance products are offered has been a lack of cooperation between veterinary and insurance companies (e.g., as was reported from Russia and the Ukraine). This is a major issue because insurers often rely on the veterinary infrastructure for their loss assessment when indemnifying farmers following an outbreak, as well as to determine whether there has been misconduct or if proper bio-security standards have not been in place.

The breadth of coverage was also relatively limited in many countries where epidemic livestock disease insurance products were offered, in many cases products were offered for only a few diseases or covered only a share of the total possible losses of livestock owners. However, as in many markets the epidemic livestock disease product is not expected to reach a very broad coverage anyhow, the degree of satisfaction of insurers was nearly evenly split, with 42% of respondents perceiving the breadth of coverage as fairly or very unsatisfactory, and 50% perceiving it as fairly or very satisfactory (see graph below).

Figure 2: Satisfaction of breadth of coverage of livestock owners



Source: Civic Consulting survey of livestock insurers

Indicating higher levels of dissatisfaction were insurers from Korea, Ukraine, and the United States. Insurers in some countries indicated high levels of satisfaction (e.g., Sweden and Russia). Breadth of coverage is reportedly especially low in developing countries due to a variety of reasons limiting the ability or demand of farmers to purchase such products, for example: (1) indemnification levels offered by insurance companies are too low; (2) deductibles are too high; (3) high premium rates; and (4) inflexibility in policy terms and conditions.

4. Pre-conditions for market-based epidemic livestock disease insurance in developing and in transition countries

4.1. Overview

4.1.1. Insurance sector

The development of the insurance sector in emerging markets remains limited in comparison to industrialized countries. In 2005, industrialized countries accounted for 88% of global premium, and emerging countries 12%. Average per capita non-life premiums were $3,287 in industrialized countries compared to $77 in emerging countries, accounting for 3.82% and 1.42% of GDP respectively. However, growth rates of premium income have been stronger in emerging markets.[94] Most developing countries have liberalised domestic insurance markets, which were dominated by state owned insurance companies. International insurance groups have increased their involvement, by joint venture or acquisition of local, state-owned or private companies.

In developing countries, insurers have concentrated on motor, industrial and life business, mainly focused in urban areas. There are significant difficulties for insurance companies to penetrate into rural areas. Small farm size, low insurance awareness, low economic capacity, poor rural distribution networks and high rural transaction costs all conspire to make rural markets unattractive to insurers. In spite of this, there has been a strong desire by governments and insurers to find solutions allowing improved access to risk management and insurance for farmers. Microinsurance has increased, but less rapidly than microfinance. There is a long experience of crop and livestock insurance in developed countries, where markets are mature. Where agricultural insurance has been tried in developing countries, the focus has been on crop insurance. Creating viable crop insurance programmes in developing countries has proved problematic. Innovative product development, such as weather index products, has been introduced in a few countries to try and overcome limitations of traditional crop insurance products.[95] Crop insurance has been a higher focus than livestock insurance for most developing countries.

In terms of global *agricultural* insurance premium (crop and livestock), most is generated in North America (58 percent) and Western Europe (28 percent). Asia accounts for about 4 percent and Latin America has 3 percent. The rest of the world comprises the remaining 6 percent. World-wide most agricultural insurance is for crops – representing 71 percent of the global premium for agricultural insurance (hail crop insurance is 22 percent and multiple peril crop insurance is at 49 percent). Only about 12 percent of global premium is for livestock (not including sporting or companion animals).[96]

Livestock insurance products which are marketed in developing countries are individual animal accidental mortality policies, sometimes including limited disease, targeted at high value breeding stock. Penetration is very low, reflecting the fact that this type of product is not attractive or economic to small farmers, and because of major underwriting and loss adjustment challenges for insurers. Where such individual-animal policies are sold, for example in India and some South East Asian countries, they have often been linked to credit for livestock, or linked to government programmes for the introduction of improved breeding stock. Individual-animal mortality policies are not feasible for lower value production livestock. Insurers have considered the introduction of herd-based deductibles, where a given number or value of animals must be lost before a claim can be made. Such policies would only be feasible for large herds, and sales of such policies are very limited even in developed countries.

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[94] Swiss Re (2006) in from Sigma Report No. 5 (2006): World Insurance in 2005

[95] World Bank (2005)

[96] International Cooperative and Mutual Insurance Federation (2004), p12-13

Industrial pig and poultry sectors can be more attractive to insurers, due to controlled indoor production conditions. Cover for livestock within these units has been offered through an extension of a property insurance policy, to cover consequential loss mortality arising from specific property insurance perils, such as fire, smoke or machinery breakdown. Property and business interruption policies do not normally cover disease.

From the above review, it can be seen that from a global perspective, the current involvement of the insurance sector in agricultural areas, and particularly with livestock producers, is very limited. Epidemic cover is even more limited, and restricted to a few developed countries.

This review also shows that there is limited potential product overlap with an epidemic product, which could be linked to government measures for disease control or eradication, and there are limited existing distribution channels to livestock producers. Further, as few insurers are specialized in agriculture, they would generally require significant capacity building to become involved in epidemic insurance programme design and implementation.

4.1.2. Reinsurance sector

Reinsurance (the insurance of insurance companies) is a way of insurers for accessing additional capital, allowing efficient transfer of risk, and expansion of risk acceptance capacity beyond the scale which would be allowed by internal capitalisation and reserve accumulation of the insurer. Reinsurance is particularly important for products with catastrophic (co-variate) exposure, such as drought, flood or epidemic disease. Financial capacity of national insurance markets is limited in many developing countries, and reinsurers play an important role.

Reinsurance availability for agricultural schemes has been highly problematic in developing countries. Whilst international reinsurers have been willing to support domestic insurers in well established property, casualty and motor lines, both crop and livestock insurance present a different level of underwriting difficulty for both insurers and reinsurers.

Acceptance of any reinsurance business by a reinsurer only follows a process of due diligence, which includes not only the analysis of the specific risk or portfolio of risks being offered, but also assessment of the integrity, operational capability and financial status of the insurance company, and of country risk. Relationships between insurers and reinsurers become established over a period of time, normally based on core business (motor, property, engineering, aviation, etc). Insurers in developing countries have, either through their own initiative or under government pressure, sought to develop agricultural products and expand in the rural areas. The reinsurers are normally the first port of call of the insurers, seeking technical assistance as well as financial capacity.

Reinsurers have found it difficult to meet the demands of insurers in developing countries, mainly for the following reasons:

- First, there has been a high need for technical assistance in design and implementation, particularly in the start-up phase. The costs of technical assistance are often high in relation to expected transaction size;
- Secondly, there have often been poor underwriting results, particularly in crop insurance, so the attractiveness to provide technical assistance and reinsurance capacity is limited;
- Thirdly, agriculture is often faced with more important infrastructure constraints than lack of insurance. Both insurers and reinsurers are frequently faced with small farm sizes, high costs of distribution, low economic capacity and lack of insurance awareness of farmers. Underwriting and loss assessment is difficult for individual-farmer policies, and there is often a lack of long term, reliable statistics needed for risk assessment and pricing.

Reinsurers have provided livestock reinsurance treaties for mortality, normally on a restricted basis and for accidental mortality. Disease is often excluded, and certainly epidemic disease, or government slaughter. Demand for livestock insurance was often from a few breeders with high value animals, or for wealthy bloodstock owners. Many insurers, however, wish to demonstrate that they can offer bloodstock and livestock, even if volumes of business are minimal.

Reinsurance for agriculture is dominated by a few of the major reinsurance companies operating internationally. There are very few domestic or regional reinsurers with technical departments familiar with agricultural risks.

In spite of this negative background, some reinsurers are actively interested in expanding and diversifying their agricultural portfolios, and are willing to consider new programmes and proposals, provided that there is a prospect of viability, and volume of business which is of interest. The prospect of building a global portfolio of diversified epidemic risks would be more attractive to reinsurers than individual national programmes. However, the situation of each country is unique, requiring adapted national programme design.

4.2. Design considerations for epidemic livestock disease insurance programmes

This section considers some key factors affecting the insurability of a market-based livestock epidemic programme.

4.2.1. General considerations

Linkage to governmental controls and compensation

Any epizootic disease insurance programme in the private sector will be highly dependent on sound government measures for epidemic disease prevention and control, as has been stressed from re-insurers interviewed for this study.

This linkage to government measures provides both opportunities and concerns for the insurer. The *opportunity* is that if significant resources are allocated by governments to develop and manage epidemic disease programmes, this provides a framework for the development of market-based insurance. Epidemic disease insurance could not be considered without an effective government prevention and control programme. The *concern* for an insurer is that the risk being underwritten is highly dependent on the effectiveness of the government's veterinary services. The insurer would need to assess the operational capacity of the government services to handle emergency disease outbreaks, and to ensure its independence, for example ensuring that it was conducted on technical criteria, outside of political interference. The insurer must also evaluate the financial capacity and willingness of the government to meet potentially major direct compensation obligations, which requires pre-planning of provincial, national and international funding.

The existence of the OIE's Performance, Vision and Strategy (PVS[97]) instrument is highly relevant to insurers and reinsurers, as an objective measure of the performance of a government's veterinary services, if linked to data on the disease threats and the national livestock industry.

The dependency on government services both alters the risk, and makes the evaluation more difficult, for the insurer. The insurer must carry out due diligence on the adequacy of the government's veterinary services, emergency preparedness, testing, and eradication programme, in addition to making an assessment of the *probability* and *severity* of the original disease outbreak.

Enrolment procedures for epidemic insurance

Under a conventional livestock mortality insurance programme, the individual farmer is inspected to determine conformity to accepted standards of husbandry, and conformity to any official veterinary requirements of the government, particularly concerning disease prevention and vaccination. It would also be normal that a veterinary certificate is issued at the time of insurance enrolment, together with animal identification (tagging). Cost-effective conventional insurance enrolment is highly dependent on the inspection and veterinary certification required, and level of skills needed of the staff concerned. It is also dependent on the herd size distribution of the potential client group, geographical distribution, availability of distribution channels and many other factors. Enrolment is more cost effective for herds normally kept on a highly commercialised basis, e.g. pig or poultry breeding or rearing; dairy herds, under fixed housing. Small herds, nomadic herds, or extensive systems of smaller livestock such as sheep or goats become progressively more difficult to enrol.

This depth of registration detail seems unlikely to be feasible for a market-based epidemic insurance programme in developing countries, in particular inspection and individual animal identification. An important question in the viability of market-based epidemic insurance is, therefore, the current systems for government registration of herds, particularly for ex-ante preparation for epidemic disease outbreak. A simplified product (requiring more minimal enrolment requirements than traditional products) would seem necessary to allow distribution of epidemic insurance in developing countries.

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[97] OIE (2006b)

Classification of livestock sectors and disease risks

The insurer needs to have a clear basis for classification of livestock into categories for insurance purposes, by livestock type, age, use and production system. The valuation basis for government direct compensation, and valuation basis for any market based insurance payments, must be transparent. Similarly, the insurer requires unambiguous classification of those diseases which are covered, and those which are not.

Such a management information system should also be a pre-requisite for government authorities responsible for disease management, and is therefore complementary to insurers' requirements.

Client and livestock database

An essential requirement for any insurance programme is that there is a comprehensive database of farmers, and of the livestock held on farms. A client database is required by insurers in order to allow identification of the insured livestock. It is also needed for the geographical zoning of insured livestock for accumulation control purposes. The data requirements for market-based insurance are greater than for government compensation, since a contract of insurance needs to exist between insured client and insurer. With government compensation, even if rules are clear, there may be no individual contractual arrangement with farmers, as government obligations after an event will be set out in appropriate legislation and associated regulations. The opportunities to enhance the operation of government epidemic preparedness, and to manage direct compensation, through an effective database of livestock and livestock farmers, are obvious.

4.2.2. Insurable risks

Some basic criteria of insurability can be applied in considering the potential scope of an epidemic insurance programme, if all other pre-conditions could be met.

To be insurable, the covered peril must be identifiable and able to be defined in the insurance policy. Epidemic insurance programmes acceptable to insurers will name specific diseases, normally following named diseases within the OIE classification. The occurrence of new strains of an existing disease emphasize the need for clarity in defining the insured peril. Difficulties in identification can arise (see the Taiwan example in the following box).

Taiwan Foot and Mouth Outbreak in Swine 1997

Taiwan, 1997: On March 19, 1997, a sow at a farm in Hsinchu was diagnosed with a strain of FMD that infected swine only. The cause of this outbreak remains unknown. However, the farm was located near a port city with a thriving pig smuggling industry and illegal slaughterhouses. It is likely that FMD was introduced through contaminated meat scraps or introduction of smuggled swine into the herd.

There are several reasons why the disease spread so rapidly:

- very high swine density;
- garbage feeding;
- hog farms close to slaughterhouses;
- frequent social farm visits;
- incomplete diagnostic laboratory capability;
- no vaccination programme.

In addition to these problems, swine vesicular disease (SVD) was endemic to Taiwan. The clinical signs of this disease are virtually indistinguishable from FMD. To further complicate matters, laboratory analysis was often not employed to diagnose SVD. Therefore, it is likely that several reported cases of SVD were actually FMD. Also, once FMD was confirmed, there was considerable delay between diagnosis and the implementation of depopulation and disposal. Finally, the compensation payments offered to farmers for swine infected with FMD were often higher than the market value of the pig, leading many farmers to intentionally introduce FMD onto their farms.

These factors contributed to the rapid spread of FMD across Taiwan and the destruction of over 3.8 million swine at an estimated cost of US $6.9 billion. Prior to this outbreak, Taiwan had been the leading exporter of pork to Japan. The disease devastated the Taiwanese pig industry and eliminated the export market.

Source: Extension Disaster Education Network http://www.eden.lsu.edu/

Under an epidemic insurance policy with named specific diseases, new or unknown diseases, or strains of diseases, (e.g. H5N1 Avian Flu), are excluded, until specifically included by insurers.

To be insurable, a risk must be able to be measured and valued. It is assumed that in any market-based epidemic insurance, the trigger for a claims event will be the declaration of an outbreak, and defined government actions (e.g. slaughter, standstill). Thereafter, loss adjustment would follow the actions of the defined veterinary services, and agreed procedures. This places a high dependency by insurers on sound practices of the veterinary services, which insurers would wish to monitor. It is noted that speed of diagnosis and implementation of emergency action can impact strongly on the extent of claims suffered by insurers.

A risk should not be able to be altered by the farmer, for example by increasing the probability of payment (moral hazard). For conventional mortality insurance, this is one of the main difficulties faced by insurers. For epidemic insurance there may also be moral hazard, if it becomes advantageous for financial or other reasons for a farmer to infect stock (see above box). This is especially true if adverse incentives are created by too high direct government compensation payments for culled animals (see Part II).

A risk should also be able to be estimated in terms of expected frequency and severity of occurrence, in order to determine the required premiums. The resulting premium should be affordable by farmers. Lack of data on past outbreaks, and the lack of ability to model potential future outbreaks in developing countries are very important factors which seem likely to constrain the interest of insurers and reinsurers in covering epidemic insurance (see section 4.4 below).

One factor affecting the expected frequency and severity of occurrence of disease outbreaks is the disease status of a country or region. A disease to be included in the insurance cannot normally be endemic in the relevant country or the part of the country where insurance is to be offered.

The knowledge of the actual disease status of the national livestock population varies from one country to another, as a function of the effectiveness of national authorities responsible for monitoring and veterinary services. Countries where there is little confidence in the disease status would not be deemed as meeting pre-conditions for insurance. It is not easy to define the “threshold of insurability” of a country, although the OIE Scientific Commission for Animal Diseases’ categorisation of countries as “officially free” from specified diseases could provide a basis for determining whether insurance pre-conditions were met. Such OIE procedures exist for FMD, Rinderpest, Contagious Bovine Pleuropneumonia and BSE. Other diseases outside of this list require countries to follow standard measures contained in the OIE Terrestrial Animal Health Code.[98] Future work would be needed to investigate the insurability of specific diseases.

4.2.3. Types of consequential loss and valuation for insurance purposes

There are many categories of direct and indirect losses and costs which may occur during and after an outbreak of epidemic disease. The main loss suffered by the farmer is likely to be the value of animals which are compulsorily culled (including pre-emptive and welfare slaughter), and these are the primary focus of government compensation. Costs such as costs of culling, disposal, cleansing and disinfection may also be incurred by the farmer, and are normally compensated by government in industrialized countries. Other costs may be incurred by parties other than farmers, such as contractors, laboratories etc (see overview of cost categories in Part I). In a large outbreak, the additional costs, and the number of parties involved in operations, may be substantial and difficult to predict in advance. For farmers, it is essential that the government obligations for compensation, and livestock valuation methodology (market valuations or a proportion of market valuations, agreed values, proportions of actual costs etc) are clearly specified, in order to provide clarity to farmers. Clear rules concerning government compensation categories, and valuation methodology, are also an essential pre-condition to insurers considering any supplementary market-based insurance products.

From the farmer’s perspective, government compensation for slaughtered animals, even if at market value, do not cover all the financial loss suffered. *Consequential on-farm losses* fall outside of government compensation. There are two types of insurance programmes, which have been introduced in the private sector for epidemic cover. The first is an “agreed value” policy, where a set financial sum is paid to the farmer, in addition to government compensation, according to the livestock slaughtered. This agreed sum is intended to reflect a part of the expected consequential loss, but there is no specific calculation of the actual consequential loss incurred. The sum payable is set out in a scale depending on livestock type, use and age. A second approach (principally adopted in Germany) is where the gross margin reduction is calculated for each insured farmer. Whilst the adjustment of individual claims will more closely reflect the true loss of the farmer, it is very unlikely to be a feasible approach in most developing countries. An agreed-value approach would have advantages of simplicity in claims administration. The principle task in the event of a claim would be the identification of animal ownership, and confirmation that the farmer concerned was insured under the market-based programme. Identification of specific insured animals would be a significant additional level of administrative requirement for the insurer.

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[98] http://www.oie.int/eng/info/en_statut.htm?e1d6

In existing private sector "agreed value" consequential loss policies, claims are normally only payable for animals actually slaughtered by government order. It does not cover losses incurred as a result of standstill orders, or market price reduction resulting from the outbreak. Such consequential losses are more complex for an insurer to define, and loss adjustment more complex.

Loss of market or price drop is not considered an insurable risk, according to reinsurers surveyed. Border closure to export of livestock or meat may be politically influenced, and the systemic nature of price risk creates a highly catastrophic exposure.

4.3. Pre-conditions for market-based epidemic livestock disease insurance programmes in developing countries

This report considers that there are many barriers to the introduction of market-based epidemic insurance in developing countries. However, pre-conditions can be listed, and would apply on a country-by-country basis:

The most significant pre-condition for the introduction of market-based epidemic insurance in a developing country is that there must be at least one insurance company in the country willing and able to take a commercial interest in establishing and distributing an epidemic disease product. Several insurers can be involved in a pool, and a lead insurer would normally be appointed by pool members. This collective approach has benefits where each company and specific individuals can be allocated by each insurer to contribute during the developmental phase. Once operational, the pool would agree to an annual plan, and appoint a lead insurer who would be responsible for risk acceptance. These insurer(s) would form a stakeholder group with other parties interested in market-based epidemic insurance. In reality, such an initiative would only follow a government plan to strengthen disease management and direct compensation, and would be linked to external technical assistance, and to the support of interested reinsurers.

Other pre-conditions for developing the insurance sector regarding epidemic disease insurance products would be likely to include:

- insurable client base of farmers in engaged in the commercial livestock sector;
- existence of an effective national epidemic disease strategy and operational infrastructure including veterinary services;

- agreed government compensation system for direct losses, backed by access to adequate national or international funding;
- defined linkage of the market-based programme to the rules and operations of the government programme of compensation, for the purposes of declaring outbreak, defining slaughter and quarantine zones etc;
- clear definition of covered and excluded diseases, and diagnostic capacity;
- existence of, or establishment of, a geographically zoned client and livestock database;
- distribution channel(s) to reach farmers, either directly or through linkage to other organization(s);
- access to external specialists able to provide the insurer with technical assistance during the feasibility study and design phase, and ongoing support;
- access to data and modelling of each covered disease, to permit estimation of maximum probable losses, establishment of appropriate financial limits, and setting of premiums;
- access to reinsurance and financial structuring;
- a viable business plan able to demonstrate the prospect of a profit margin to the insurer, after considering distribution and overhead costs, and reinsurance costs;
- adequate legal and regulatory framework.

Pre-conditions for developing the reinsurance sector regarding epidemic disease insurance products include those points listed under “insurance sector”, plus:

- assessment of the capacity of the insurance company(ies) to manage the proposed market-based programme;
- assessment of the adequacy of operational procedures of the original programme, including risk acceptance, loss assessment, veterinary testing and controls, including catastrophic event preparedness;
- assessment of exposure to anti-selection and moral hazard;
- assessment of adequacy of proposed premium rating, limits, terms and conditions of the original programme;
- setting of reinsurance structure, particularly the layering of risk for non-proportional reinsurance, in relation to expected frequency of claims. Reinsurers will require defined limits to their financial liability, by district, province and in total;
- acceptable return on capital allocated, according to each company’s internal acceptance practices;

- an opportunity for diversification of risk nationally or internationally would make the overall programme more attractive but need not be a pre-condition to a particular national proposal.

4.4. Financial considerations for epidemic livestock disease insurance programmes

Risk assessment, data, and disease modelling

In European countries, considerable research has been carried out for insurance purposes to estimate the frequency and severity of major livestock diseases, using Monte Carlo simulation.[99] Relevant national input data for modelling includes: number of historical primary and secondary outbreaks of the disease; slaughter policy of infected animals; pre-emptive slaughter policy; protection and surveillance restriction zones; movement standstills; vaccination and emergency ring vaccination policy; and animal welfare slaughter policy. Data on livestock numbers and density is needed on a regional basis in each country, and in adjacent countries; herd density and herd size; and economic data relating to defined types of consequential loss.

From the above list, it is apparent that simulation of disease risk, and of the expected frequency and value of economic loss, is complex, and highly dependent on data quality. Furthermore, the construction of effective models is a skilled task. The models also require that disease management rules have been set by authorities: for example, the radius of farms within pre-emptive slaughter and standstill zones; standstill durations; quarantine periods prior to re-stocking; breeding prohibitions, etc. This re-emphasizes the pre-condition of well-defined government emergency procedures. Further, economic data are required to value the consequential losses.

It seems unlikely that data is available to allow modelling in sufficient detail for insurance premium rating purposes or for estimation of maximum probable losses in most developing countries. Development of models in each country and for each disease would be a major task and would not seem likely to be justified if carried out solely for insurance rating purposes. However if carried out for other national disease management purposes, there could be a synergy of interest in creating risk assessment tools which are appropriate to wider needs.

A further conclusion from the above is that a simplified “agreed value” basis for any consequential loss (“indirect”) market-based insurance product would seem advisable, rather than an individually-adjustable gross margin basis of calculation.

Premium calculation

The premium of any insurance product is the sum of

Expected Loss + Expense Load + Cost of Capital

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[99] Meuwissen et al. (2003)

The *Expected Loss* is the product of the expected frequency of claims multiplied by the severity (average value) of claims. In the case of livestock epidemic insurance, claims are expected with low frequency and potentially high severity. Epidemic modelling would be the optimum way to estimate scenarios of Expected Loss from individual events. *Overcoming the lack of data to estimate the Expected Loss is a major constraint to development of market-based epidemic insurance products.*

The *Expense Load* comprises the operational costs to the insurance company of distributing the product, overhead administration of the insurance company (e.g. staffing, legal, management, etc.), inspection costs, and loss adjustment costs. These are considered in the next section. *Products for epidemic insurance in developing countries would require simplified design, which minimized the costs of delivering and underwriting such insurance, and adjusting losses.*

The *Cost of Capital* relates to the amount of capital that an insurer needs to allocate to meet potential claims. Since epidemic insurance is a catastrophe risk, the Probable Maximum Loss (PML, an estimate of the worst expected payout in a given time period) may be high. The larger the loss PML, the higher will be the insurer's capital allocation, and cost of obtaining sufficient access to contingent capital, for example through reinsurance. In common with other catastrophe programmes, the cost of capital for epidemic cover is relatively high. *Costs of capital would need to be minimized as far as feasible. One option would be to consider providing government and donor access to high level catastrophe layers of reinsurance, allowing international reinsurers to be involved in intermediate layers of risk, and domestic insurers in primary layers of risk.*

If other preconditions are met, premium costs for market-based epidemic insurance could be high, due to capital allocation costs and uncertainty loading[100] in modelling the financial outcome of such programmes.

Willingness and ability of farmers to pay for market-based epidemic livestock insurance

Research into farmers' perceptions of risk in relation to crop insurance has shown that farmers do not recognize the importance and potential impact of infrequent but severe losses, and are not *willing* to pay the premiums associated with protection from such events ("cognitive failure"[101]). This affects the ability of insurers to sell catastrophe crop insurance products at actuarially fair premium rates. A similar attitude could be expected regarding the purchase of livestock epidemic insurance policies. This view may be reinforced if farmers are aware of the existence of a government compensation scheme, and of likely ad-hoc disaster relief following an outbreak. This implies that only the most risk aware farmers might be willing to consider such insurance. Responses from reinsurers in the present study suggested that farmers only purchase epidemic insurance during and shortly after an outbreak. Lack of continuity of voluntary participation in epidemic insurance makes it more difficult to calculate premium rates based on long-term participation.

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[100] Uncertainty loading is required by insurers to allow for uncertainty in deriving premium rates, due to poor data, new disease epidemiology, and as a safety margin

[101] Skees et al. (2005)

The *ability* of farmers to pay for epidemic cover in developing countries is also a significant hindrance. Poverty and low annual average income of farmers in most developing countries means that the profit margin available to accommodate such premium is likely to be generally low, but will depend on degree of commercialisation of each livestock sub-sector. Many subsistence producers may be outside the formal financial sector. Narrow profit margins often exist even in the more industrialized livestock sectors, such as poultry.

In the case of crop insurance, uptake has been highest where there is a linkage of insurance to protect financing of crop production (crop credit insurance). The same is the case for livestock insurance in India. This emphasizes the need for an integrated approach for insurance in agricultural areas, linking finance or marketing channels to insurance sales. Private sector insurance agricultural programmes are normally voluntary, although may be indirectly made compulsory if lending institutions require that the insurance is purchased.

Premium subsidy

Due to the low average income of farmers, and importance attached to risk management by governments, premium subsidies have extensively been made available for crop insurance. However, epidemic insurance differs in that there is already a heavy implied cost to government in meeting direct compensation costs, and any additional costs of premium subsidy for market-based insurance might not be considered justified or feasible.

Operational costs

Costs incurred by an insurance company in operating an insurance scheme include the following categories:

- Overhead costs (management, administration, IT, legal, salaried staff, etc.);
- Distribution costs (commission to agents or distribution organisations, sales staff, etc.);
- Enrolment costs (inspections, registration of farmers, database management, etc.);
- Loss adjustment costs (assessors, inspectors, testing, etc.).

As noted, the high costs of distribution and loss adjustment are one of the major barriers to insurers operating in rural markets in developing countries. There is a balance to be made between levels of underwriting controls, the degree of simplification of product design, and operational costs. This would be a critical issue in the design of an epidemic product for livestock in developing countries. The key cost issue would appear to be in whether farm inspection is necessary at enrolment, since loss adjustment will be expected to follow government processes for slaughter. Insurers would not be directly involved in the decision concerning slaughter, which would be based on the pre-established disease control regulations. The insurer and reinsurer would, however, wish to monitor the decisions taken by government officials and be concerned to know that these were based solely on technical grounds.

Distribution is also a critical issue since product distribution options are closely linked to the level of skills necessary for enrolment, itself directly related to simplicity of product design. It also dictates the extent to which third party agents could be trained in sales. Distribution agents could, depending on the product sophistication, could be rural banks or microfinance institutions, or rural input or service suppliers, as well as individual agents.

Reinsurance layers

A typical structure for agricultural reinsurance is that non proportional (stop loss) reinsurance protects the insurer, in the event that loss ratio of all disease claims (claims divided by gross premiums, in percentage) exceed a given threshold (for example 100% loss ratio). The reinsurers then pay the next claims, up to the reinsurance limit (for example when the loss ratio reaches 200%). In most forms of agricultural insurance, the insurer will try to purchase reinsurance up to their best estimate of the Probable Maximum Loss (PML).

Given the nature of catastrophe epidemic diseases, where events are expected to be infrequent but potentially severe, the majority of the risk has, of necessity, to be transferred to reinsurers. Reinsurers providing protection for conventional livestock mortality business can expect a far less volatile result, as individual risks are not correlated, or only partially correlated, and the insurer can retain a higher proportion of the risk.

Government catastrophe reinsurance

An alternative consideration for support by government (or international development organisations) would be for government to provide high-level reinsurance capacity in excess of layers of risk placed into the international reinsurance market place. This approach has been implemented for a different scenario of livestock mortality index insurance in Mongolia, where World Bank backed contingency funding will operate at extremely high levels of loss.

5. Options for an Animal Epizootics Insurance Scheme to support the development of market-based insurance products

As has been described in the previous sections of this report, there is limited or no experience of epidemic insurance, and rather limited experience of traditional livestock insurance, in most developing countries. The insurance sector is often weak in rural areas. This provides a very challenging background to the introduction of products such epidemic disease insurance that are highly technical and covers catastrophic risk. Before discussing options for an Animal Epizootics Insurance Scheme to support the development of market-based insurance products, it is important to recall the other challenges that such a scheme has to address.

5.1. Challenges faced in supporting the development of market-based insurance products

A main pre-condition for developing this type of insurance is the existence of a well-planned government disease prevention and control programme. It is assumed that a market-based product would need to be fully aligned to a well-prepared government slaughter and compensation programme. A crucial element is an appropriate veterinary service. The OIE PVS instrument could be very valuable in assessing it. However, the effectiveness of the veterinary services, and of its ability to implement disease prevention and control, is also affected by the structure and degree of commercialisation of the livestock sector in each country. This varies significantly from one country to another.

Any scheme to support the development of epidemic livestock disease insurance would have to take into account that each country has different circumstances concerning rural insurance, capacity of insurers, as well as organization and disease status in the livestock sectors. Each country would require tailored adaptation of epidemic disease insurance solutions, although this could be eased within a framework for international standardization in product design, backed by international technical assistance, capacity building and reinsurance. Innovative solutions for product distribution, farmer enrolment and loss assessment seem essential in the absence of existing synergies and the current poor development of livestock insurance. Key factors from an insurer’s perspective include:

- In terms of **product design,** an agreed-value policy, with a claim triggered by defined government slaughter for **specified diseases**, and providing a payment to farmers which was supplementary to government compensation, would offer the simplest approach.

- In terms of **marketing**, few existing marketing channels exist for insurers to reach the rural community, and innovative solutions would need to be developed, preferably allowing **low distribution costs**. Often farmers have limited insurance awareness, and may have low willingness and ability to pay premium, and sales of such a market-based policy would need to overcome these hurdles. Demand for such a market-based product would need to be tested, as experience in crop insurance indicates that there is an unwillingness to purchase insurance for events occurring with low frequency.

- In terms of **risk acceptance**, simplified minimum acceptance criteria would need to be developed, compared to more complex risk acceptance needed for conventional livestock mortality insurance, which requires farm inspection and veterinary certification.

- In terms of **underwriting**, the key difficulty lies in **product pricing**, due to the absence of data required for risk assessment of frequency and severity of whichever specified diseases are to be insured, and difficulties in modelling expected future outbreaks. Further, new strains of disease (e.g. AI) may have unknown epidemiology and unpredictable financial impacts.

- In terms of **loss assessment**, it may be possible to follow government slaughter decisions, which for the insurer means a need for confidence in the independence and integrity of the services responsible for government slaughter decisions.

These factors demonstrate that a high level of capacity building would be needed by the insurance sector in most developing countries, and high levels of technical assistance to undertake development of products, risk assessment, product pricing, and support for insurers. Within each country, an integrated approach to any market based insurance solution is required, where linkages could be forged to initiatives such as creation of farmer databases, livestock registration, classification of herds, and disease prevention. Insurers could play a part in such process, but they would only be one stakeholder in a wider range of organisations and initiatives aimed at prevention and management of epidemic disease.

Finally, the financial management of the consequences of disease outbreak, with infrequent but potentially severe claims, require major risk transfer by domestic insurance sectors, which have low financial capacity and may be unwilling to commit significant risk capital to such types of insurance. International re-insurers would need to play an important role, and would be more interested in a programme which aimed to develop such cover in many countries, achieving some economies of scale in product and mechanisms, and some risk spread. The financial capacity and willingness of the insurance sector in each country means that major risk transfer is needed. Financial structures for national retention of risk, layers of commercial reinsurance, and possibly high-level government-backed catastrophe cover could be foreseen.

5.2. Conclusions on options for an Animal Epizootic Insurance Scheme to support the development of market-based insurance products

Global versus national approach to a scheme

Given the infrastructural and technical constraints to market-based epidemic insurance identified throughout this pre-feasibility study, our conclusions are very guarded as to the potential for a “scheme” for the development of market-based insurance products. In particular, no “universal” scheme can be foreseen which would be suitable for application in all countries. The extent to which market-based insurance could develop is strongly influenced, country-by-country, by the following national features:

- Degree of commercialisation of the livestock sector(s): Market-based epidemic insurance is a financial instrument and could only be feasible for farmers operating in the emergent or commercialised livestock sectors, where clients were willing and able to pay insurance premiums.

- Degree of development of the insurance sector in the rural areas: Current penetration of insurance markets into rural areas is, on average, low. Epidemic product sales would be hard where insurers do not have a rural client base or linkages to a distribution network. Similarly, the capacity of the national insurance market to develop expertise in underwriting an epidemic product varies according to the degree of sophistication of the market.

- Degree of development of government capacity for epidemic livestock disease management is a pre-condition to commercialised insurance: for example, veterinary services, epidemic risk management capacity, advance planning for epidemic outbreak, herd registration and databases. These characteristics differ widely from country to country, as does the current status of endemic and epidemic disease in each country.

A conclusion is that there is a wide diversity between countries in the pre-conditions existing for an epidemic product. This is in a context that there are very limited private sector epidemic insurance programmes even in industrialised countries. Hence, there is limited experience, in comparison to other classes of insurance, of epidemic scheme design and of best practices to act as examples for international transfer of know-how.

Countries could be classified according to the status of their livestock sector, of their insurance sectors, and of their government veterinary services to identify those that are likely to be most favourable to market-based epidemic insurance.

The existence of the PVS instrument provides a strong objective measure of veterinary services, and could be a starting point for assessment of the key preconditions. This is complementary to the objectives in terms of eligibility to GERFAE (see Part II).

Synergy of market-based insurance and GERFAE objectives

In spite of the negative outlook for a scheme for market-based epidemic insurance, there are high degrees of synergy between the needs of the insurance market, both for conventional livestock mortality insurance, and for epidemic disease insurance, in the strengthening of governments' measures to improve veterinary services, and associated measures, in particular in establishing a database for the registration and identification of the national livestock herds and their owners.

Further, the operation of a market-based product would need to be integrally linked to a government compensation system for livestock. All the measures foreseen as necessary to strengthen the effectiveness and efficiency of emergency preparedness, for example development of pre-outbreak emergency preparedness, and developing compensation protocols, and post-outbreak response capacity, are fully aligned with the needs for commercial insurance (see Part II). Thus, in spite of the constraints identified, the development of a sound governmental epidemic prevention and response programme could lay the foundation for the private insurance market to offer parallel products. This seems most likely to occur only in those countries with better developed or innovative insurance markets, where there are insurers specialising in the rural sector, where commercial livestock sectors exist, and developed distribution networks such as agricultural banks and microfinance organisations. Wider penetration of livestock insurance is seen in some transition countries.

A complimentary synergy between public compensation and private sector insurance is that insurance creates a formal contractual arrangement between insurer and the individual farmer, whereas public compensation standards, guidelines and rules are targeted to livestock owners in general. This contractual arrangement requires *ex ante* establishment of databases of insured farmers and their herds, and legally binding rules for claims payment. It requires accurate definition of insured and excluded diseases, which may be more generally defined under government compensation guidelines. In crop insurance, there are examples where the databases of insured farmers are superior to any government records of farmers and their production systems.

Strategies which could *directly* encourage private sector epidemic insurance include:

- Premium subsidy: Subsidisation of private sector epidemic insurance does not seem convincing, given that limited government financial resources are required, as a priority, to implement national risk prevention and control services, and in particular to provide financial compensation for compulsory slaughter. Subsidisation of a supplementary, private-sector, consequential loss insurance product would not seem sustainable, and certainly not in the context of a global scheme, although might be considered as a government measure in specific countries.

- Public sector reinsurance: This measure does not seem to a priority, unless bottlenecks in private sector reinsurance are identified. Private sector reinsurance may be forthcoming, provided that the original insurance programmes are viable. Key factors identified by reinsurers remain data for pricing, and independence of government veterinary services. The main constraints to epidemic insurance are in building national "ground up" programmes capacity, as "top down" financial instruments will not substitute for viable local programme design and operation. The existence of a national pool of insurers, or international pool of reinsurers, cannot substitute for sound local implementation, such as animal identification systems, animal health information, and database development.

- Promotion of public – private partnerships: Encouragement of pilot projects funded by a scheme similar to the Canadian PSRMP programme. PSRMP is a Business Risk Management (BRM) programme funded through the Agricultural Policy Framework which provides financial and technical advice to industry-led projects seeking new risk management tools developed and/or delivered by the private sector, in order to cover gaps in available farm-level risk management coverage. Such an initiative would bring together national and international representatives of the financial services industries to create projects, which may receive technical assistance funding.

- Technical assistance: As noted, it is unlikely that insurance or reinsurance markets will act as the prime movers for the development of private sector epidemic insurance. Preconditions to insurability are completely linked to the existence of government services, so that the development of such services is a pre-cursor. Hence, direct technical assistance to insurers does not seem useful in isolation. A phased approach could be foreseen, where insurers are increasingly involved, building on the initial development of sound epidemic preparedness and response. A degree of international standardisation implied by the current project would increase the cost-effectiveness of global technical assistance. Key aspects where technical assistance could be needed are to advise governments in strengthening disease management and in putting in place an *ex-ante* programme for direct compensation. Risk assessment tools required by governments would also benefit insurers.

Strategies which could *indirectly* encourage private sector epidemic insurance include:

- Development of government and international veterinary services capability: as a foundation for an insurance programme which supplemented the government compensation system. The synergy of this approach is described above.

- Establishment of improved information systems: available to insurers, to allow better assessment of livestock health and disease, and to encourage development of some internal technical capacity within insurers as a first step towards developing products (both epidemic insurance and traditional mortality insurance).

- Client and livestock database: An essential requirement for any insurance programme as well as for government compensation programmes is that there is a comprehensive database of farmers, and of the livestock held on farms. This is not only needed for the identification of livestock, but also geographical zoning for control purposes. An important issue in this respect is the definition of minimum requirements regarding the systems for (government) registration of herds.

- Classification of livestock sectors and disease risks: Development of best practices for management information system for a classification of livestock into categories, by livestock type, age, use and production system, which could also be a pre-requisite for government authorities responsible for disease management and direct compensation, is fully complementary to insurers' requirements. Development of herd identification, classification and databases, and access to animal health inspection and status reports, could benefit animal health management as well as provide a basis for confidence of insurers in livestock risk management by potential clients.

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Annex 1: Survey questionnaire

QUESTIONNAIRE ON INSURANCE COVERS FOR EPIDEMIC LIVESTOCK DISEASES

*

CONDUCTED FOR THE OIE, THE WORLD ORGANISATION FOR ANIMAL HEALTH

Please return questionnaire by email to survey@civic-consulting.de or by fax to +49-30-2196-2298 before 20/12/2006

We also offer to jointly fill in the questionnaire and discuss your comments during a phone interview, should you prefer this (see contact details below).

IDENTIFICATION DATA

a) Name and country of organisation:

Please specify

b) Type of organisation:

Insurance company ☐ Association of insurers ☐ Re-insurance company[1] ☐

Broker ☐ Other ☐ *Please specify*

c) Questionnaire completed by (Name of person, position, contact details):

Please specify

INTRODUCTION

The World Organisation for Animal Health (OIE), with support from the World Bank, has commissioned Civic Consulting to carry out a study on market-based insurance products for losses related to epidemic livestock diseases such as Foot-and-Mouth Disease or Avian Influenza. The study will describe the insurance products currently offered by insurers worldwide. It will also assess options for a global Livestock Disease Insurance Programme to provide technical and/or financial support for the development of market-based insurance products for epidemic livestock diseases.

The information you will provide through this questionnaire will be crucial to assess the feasibility of different options for supporting the development of the livestock insurance market. We therefore greatly appreciate your contribution.

Do not hesitate to contact the person listed below should you have any further questions:
Kristen Schubert (survey@civic-consulting.de) Phone: +49-30-2196-2295 Fax: +49-30-2196-2298

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[1] Note for re-insurers providing services on more than one national market: Please provide in the country specific questions an overview of the situation in the major markets you cover.

I) MARKET SITUATION FOR LIVESTOCK INSURANCE

1. Is insurance cover for livestock related risks available on the market in your country?

Yes ☐ No ☐ *If no, please continue with section IV*

- **If yes,**

a) What are the risks covered by the insurance?

Please specify

b) For which animal diseases is insurance cover available? Please specify by type of livestock.

Please specify

c) Are epidemic livestock diseases defined in the insurance as a non-covered risk?

Please specify

2. Is insurance cover for epidemic livestock diseases available on the market in your country?[2]

Yes ☐ No ☐ *If no, please continue with section IV*

- **If yes,**

a) What is the definition of epidemic livestock diseases used in the insurance? Is it a statutory definition?

Please specify

b) What is the approximate market share of epidemic livestock disease insurance (insured/total)? Please differentiate by type of livestock and disease.

Please specify

c) What is the approximate number of insurers providing this cover presently? Please differentiate by type of livestock and disease.

Please specify

d) What is the approximate number of farmers and number and type of livestock insured presently? Please differentiate by type of livestock and disease.

Please specify

---

[2] Please fill in this section even if the insurance cover is part of a more general cover for livestock related risks.

e) Could you indicate the total premium income received for epidemic livestock disease cover[3] in each of the years 2000-2005 (in Euro or USD)? Please differentiate by type of livestock and disease.

Please specify

f) What were the most significant claims against epidemic livestock disease cover in the period 2000-2005 (in Euro or USD)? Please differentiate by type of livestock and disease.

Please specify

3. Is there demand for epidemic livestock disease insurance that is not satisfied at present?

Yes ☐ No ☐

- **If yes,** for which type of livestock and undertakings? Please provide reasons why demand is not satisfied.

Please specify

4. What reinsurance is used for the existing insurance covers and who is the reinsurer?

Please specify

5. Does the government provide support to private epidemic livestock disease insurance?

Yes ☐ No ☐

- **If yes,**

a) Since when? What is the name of the support scheme?

Please specify

b) What is the national legal basis? Administering institution?

Please specify

c) For which type of livestock and type of disease?

Please specify

d) Is the government support dependent on specific conditions (e.g., prevention measures, etc.)?

Please specify

---

[3] Provide general figures for livestock insurance if epidemic disease is included as part of animal accident and disease mortality policy.

e) What type of support is provided (e.g., subsidy of insurance premiums, governmental reinsurance, etc.)?

Please specify

II) INSURANCE PRODUCTS CURRENTLY AVAILABLE

6. Type of cover - Is cover for epidemic livestock diseases …

a) Systematically offered with non-specialised cover (e.g., general livestock insurance)?

Yes ☐ No ☐

b) At an additional premium?

Yes ☐ No ☐

c) Or is it supplementary cover?

Yes ☐ No ☐

d) In this case, is it:

Optional ☐ Compulsory ☐

7. Are separate covers available for epidemic livestock diseases (i.e., stand alone insurance products)?

Yes ☐ No ☐

Please specify

8. For which epidemic livestock diseases is insurance cover available? Please specify by type of livestock.

Please specify

9. Which epidemic livestock diseases/types of livestock are considered to be uninsurable?

Please specify

10. Who is the holder of the insurance policy (individual farmers, farmers' associations, etc.)?

Please specify

11. What is, generally, the period of validity of cover?

Please specify

12. What exclusions are generally included in contracts?

Please specify

13. Subject of the cover

a) What direct losses are included in the cover (e.g., value of livestock, culling and rendering costs)?

Please specify

b) What is the basis for the indemnification of direct losses (e.g., value of livestock, number of affected livestock)?

Please specify

c) What consequential losses are included in the cover (e.g., reduction of animal value, interruption of production, movement and marketing restrictions, costs for vets/medicines, safety measures)?

Please specify

d) What is the basis for the indemnification of consequential losses (e.g., a percentage of insured sum, duration of business interruption or actual losses)?

Please specify

e) What losses cannot be indemnified?

Please specify

14. Do the insurance products available have a maximum compensation limit (ceiling of coverage)? Per year or per single claim?

Yes ☐ No ☐

- **If yes**, what are the amounts used as ceiling of coverage (in Euro or USD)?

Please specify

15. Do the insurance products available include a deductible?

Yes ☐ No ☐

Please specify

16. What are the obligations of the policy holder:

a) Specific prevention measures? (e.g., on-farm health plans, etc.)

Yes ☐ No ☐

Please specify

b) Other obligations?

Yes ☐ No ☐

Please specify

17. What is the definition of the trigger of coverage (i.e., what are the criteria that must be fulfilled in order for the insurance to apply)?

Please specify

18. What are the underwriting procedures used? (E.g. eligible/target market, acceptance criteria, national disease status, farm inspection, farm limits, zonal limits)

Please specify

19. Is there, on your market, legislation requiring farmers in certain sectors to take out such cover?

Yes ☐ No ☐

- **If yes**,

Please specify

20. Are epidemiological models employed to determine premium rates?

Yes ☐ No ☐

- **If yes**, have you developed this model yourself?

Please specify

21. What are the claim settlement procedures used?

Please specify

III) STRENGHTHS AND WEAKNESSES OF EXISTING EPIDEMIC LIVESTOCK DISEASE INSURANCE PRODUCTS

22. How would you assess the breadth of coverage of livestock owners (i.e., are the relevant groups of livestock owners reached by the products)?

Breadth of coverage of products is ...	Very unsatisfactory	Fairly unsatisfactory	Fairly satisfactory	Very satisfactory	Don't know
	☐	☐	☐	☐	☐

Please specify which group of livestock holders is specifically reached (e.g., small livestock owners, cooperatives, etc.)

23. How would you assess the operational effectiveness of the epidemic livestock disease insurance products?

Operational effectiveness of products is ...	Very unsatisfactory	Fairly unsatisfactory	Fairly satisfactory	Very satisfactory	Don't know
	☐	☐	☐	☐	☐

Comments

24. How would you assess the financial performance of the products?

Financial performance of products is ...	Very unsatisfactory	Fairly unsatisfactory	Fairly satisfactory	Very satisfactory	Don't know
	☐	☐	☐	☐	☐

Please specify the average loss ratio over the last decade

25. How would you assess *your* general level of satisfaction with the existing epidemic livestock disease insurance products?

We are ...	Very unsatisfied	Fairly unsatisfied	Fairly satisfied	Very satisfied	Don't know
	☐	☐	☐	☐	☐

Comments

26. **How would you assess the general level of satisfaction of *livestock owners that have insured their livestock* with existing epidemic livestock disease insurance products?**

Livestock owners are generally ...	Very unsatisfied	Fairly unsatisfied	Fairly satisfied	Very satisfied	Don’t know
	☐	☐	☐	☐	☐

Comments

IV) PROSPECTS FOR EPIDEMIC LIVESTOCK DISEASE INSURANCE

27. Do you consider epidemic livestock disease insurance to be a growth segment in terms of future development for insurance companies?

Yes ☐ No ☐

- **In either case**,

a) What are the reasons?

Please specify

b) What are the main barriers to the development of appropriate insurance products?

Please specify

28. What public measures could encourage the development of this market segment and what would be an appropriate role of the government?

Please specify

29. What should according to your view be the focus of a possible global programme of support for the development of epidemic livestock disease insurance products?

Please specify

V) COUNTRY BACKGROUND: PUBLIC AND OTHER COMPENSATION SCHEMES FOR EPIDEMIC LIVESTOCK DISEASES

30. Is there a public compensation scheme for losses of farmers due to epidemic livestock diseases in your country (without involvement of private insurers)?

Yes ☐ No ☐ Don’t know ☐

- **If yes,**

a) What are the name and the legal basis of the public compensation scheme?

Please specify

b) What type of scheme is it (sector-wide fund etc.)? How is it financed?

Please specify

c) What epidemic livestock diseases are covered by the public compensation scheme?

Please specify

d) What costs are covered by the public compensation scheme?

Please specify

e) Who is covered by the public compensation scheme (livestock owners, third party, others)?

Please specify

f) Who administers the public compensation scheme (please provide name of institution/s and contact details)?

Please specify

g) Is the public compensation scheme partly co-financed by the livestock holders in your country?

Yes ☐ No ☐ Don’t know ☐

31. Was there ad-hoc compensation paid by the government to farmers (not related to a public compensation scheme) in case of epidemic livestock diseases in the period 2000-2005?

Yes ☐ No ☐ Don’t know ☐

- **If yes,**

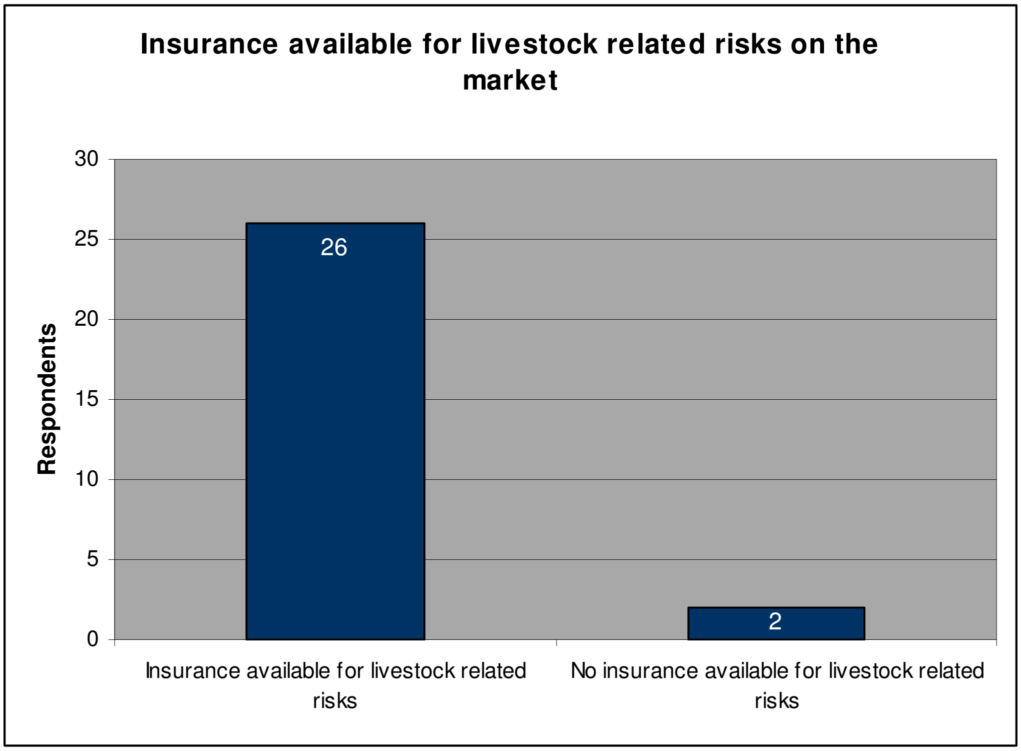
Please specify

Annex 2: Results of survey of insurers

Annex: Responses received from Questionnaire to Insurance Representatives

I) MARKET SITUATION FOR LIVESTOCK INSURANCE

Question 1: Is insurance cover for livestock available on the market in your country?



Answers indicating that there was no insurance available for livestock related risks were received from Chile and the US, though many other insurers from the US indicated that there was indeed insurance available for such products. In general, it is quite clear from responses to the questionnaire that insurance products for livestock related risks are common.

Question 1: What are the risks covered by the insurance, for which animal diseases in insurance cover available, and are epidemic livestock disease defined in the insurance as a non-covered risk?

Country	Risks covered by the insurance?	Animal diseases for which insurance cover is available	Are epidemic livestock diseases defined in the insurance as a non-covered risk?
DE-Munich Re		Big industry in Israel insured under the national scheme headed by David Kinsberg-10 million dollars in premium in livestock. It is a state-funded scheme (government subsidizes premium and the reinsurance capacity). This is a similar scheme to Agroseguro but superior in that they have secured a much larger market. Other countries with livestock risk insurance products: Turkey, Japan, Southeast Asia, South Korea (with some individual animal compensation scheme), Latin and South American (specifically Chile) has some related products (though it is not actively marketed, only available upon the request of the farmer and not widely available), Mexico	
CH-Swiss Hail Insurance	Death as a result of diseases and accidents	All kinds of acute life-threatening diseases	Yes
GR-Association of Insurance Companies	Mortality risk	All diseases apart from epidemics and few exclusions, named in each type of policies.	YES
NL- Verbond Van Verzekeraars	Accident and diseases	All livestock diseases, except those for which a compensation scheme exists managed by the authorities	Yes all diseases which are covered by a compensation scheme managed by the authorities
ES-MAPFRE		- Cattle - Loss of production (in terms of milk or calves) as a result of slaughter following Brucellosis (BCL), Leucosis, Tuberculosis (TBL), Contagious bovine pleuropneumonia, Bovine Spongiform Encephalopathy (BSE). - High value animals' cover: Difference	The epizooties are excluded as per default. Those that are insured are "named covers".

		between Ministry of Agriculture compensation and additional investment to enhance livestock (i.e. genetic improvement). - Swine - Loss of production (activity interruption) following Swine Fever (Classic or African). - Horses - Slaughter following African Horse Sickness. The indemnification will be the difference between the animal value and the Ministry of Agriculture compensation.	
CH- Partner RE	Almost every country has some sort of livestock insurance against mortality. Due to the catastrophic exposure of epidemics most policies exclude government slaughter order or any other order given by the government. e.g. import restriction Mortality, loss of use, sometimes extended to cover fertility risks, loss of profits following natural perils and other named perils such as accidents poisoning theft,	Under standard livestock policies mortality due to List B and C disease. Treatment cost, vet cost are usually not covered. In rare cases (Spain Israel) mortality of List A diseases is also covered when vaccinated against. However governmental slaughter order is then still excluded avoiding the cat risk.	In standard covers excluded, but specific covers exist.
20-CH-PartnerRE-interview.doc	Livestock is relatively well insured -loss of use -fertility -loss of profit -fire -usually they exclude epidemic -accident -theft -perils	Those that offer--normally restrict it to the list c and b (normally exclude epidemic) sometimes farmers assoc will cover it not insurers Spain or Israel: epidemic are included, the insurer will pay for dead animals but when govt starts culling as control measure, those are not paid (losses by government control not the disease). When government slaughter sets in and whole areas are shut down--liability is much larger and then it is excluded from insurance cover (though they may cover a single farm) Too systemic: expensive. Epidemics are	

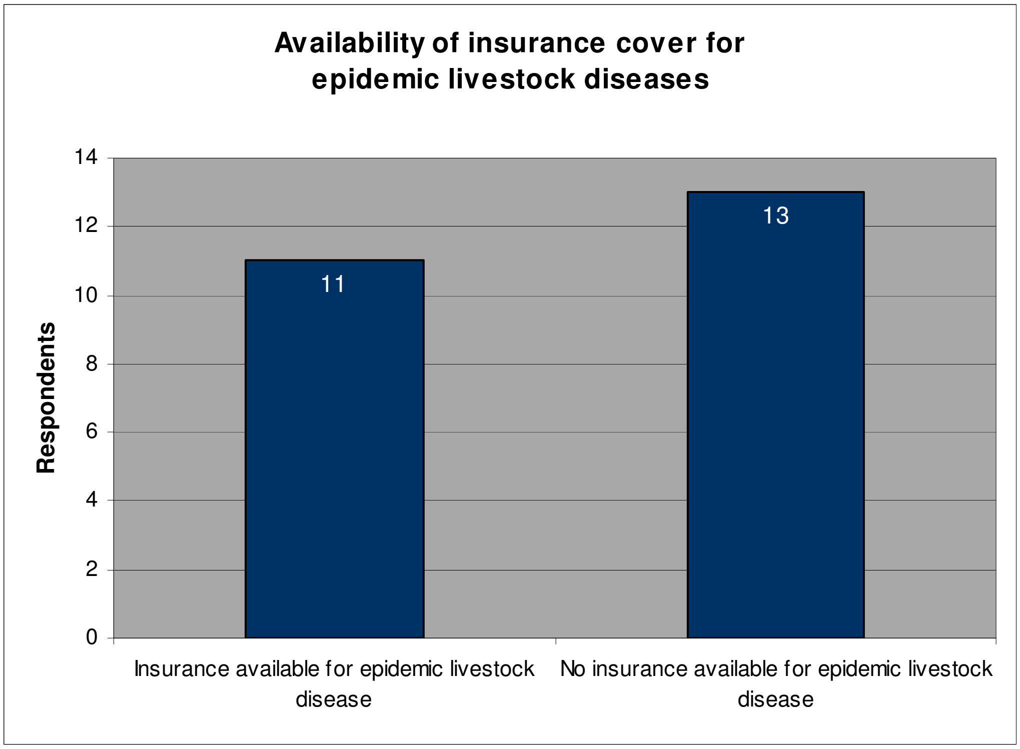
		expensive when govt controls shut down whole area	
Korea-Komill Broker Service Co., Ltd.	Accidental Death (including any disease except legal Epidemic), including Emergency slaughter, Sterility mainly result from Natural catastrophe	Pigs only, covering Transmissible Gastroenteritis(TGE virus), Porcine Epidemic Diarrhoea (PED virus, and Rota virus	Yes, all kind of legal Epidemic is not covered
Uganda-Lion Assurance-rev-after Interview.doc	LIVESTOCK MORTALITY EMERGENCY SLAUGHTER ON MEDICAL GROUNDS The following diseases are however excluded	Policy covers all other diseases except - tuberculosis - horse-sickness - redwater or gall sickness - foot and mouth for the western region of Uganda - avian flu . Cover is for all bovine species	Epidemic diseases are specifically excluded. However , since beginning of 2006 a product is offered that includes FMD(only in the Northern part of Uganda). This insurance policy is required by the East African Development Bank for farmers that want to receive a loan. Until now only few farmers have concluded a contract
Uganda-Lion Assurance	LIVESTOCK MORTALITY EMERGENCY SLAUGHTER ON MEDICAL GROUNDS The following diseases are however excluded	Policy covers all other diseases except - tuberculosis - horse-sickness - redwater or gall sickness - foot and mouth for the western region of Uganda - avian flu . Cover is for all bovine species	Epidemic diseases are specifically excluded
GB-Heath Lambert Group	Animal Mortality, Specified Perils + Whole Herd Disease Insurance.	Anthrax - all species. Foot + Mouth Disease - Bovine, Ovine, Porcine, Camelids. Aujeszky's, European Classic Swine Fever + Swine Vesicular Disease - Pigs. Avian Influenza + Newcastle's Disease - Poultry.	Yes, Government Slaughter Diseases are excluded under a standard All Risks of Mortality policy unless specifically extended.
FR -Groupama SA, Chinese branch	In CHINA: mortality of livestock in case of health and accident	all type of health , depend of reinsurance agreement	Bird flu
Thailand-General Insurance Association	All Risks	Dairy Cow	Yes, but there is a waiting period between the first 15-30 days.
USA-Hartford Financial Services Group	Fire, lightning, other weather related perils, theft	Diseases are excluded for most all food value animals, i.e., cattle, sheep, swine, poultry	Not defined

USA-McMillan Warner Mutual Insurance Company	Basic insurance perils plus Death by Electrocution, Attack by Dogs or Wild Animals, Accidental Drowning, Accidental Shooting, Injury from loading or unloading, Collapse, Collisionor overturn of Conveyances	None	No
USA-National Farmers Union Property and Casualty Insurance Company	We write livestock farms, including hog confinements and cattle feedlots, for property and liability.	We do not specifically cover the animals for any diseases, the livestock are covered for specific perils such as fire, windstorm, theft, etc.	Yes
USA-Rural Mutual Insurance Company	Named Perils, drowning, attack by wild animals.	I am not aware of any disease coverage	
UK-Crowe Livestock Underwriting Limited	(1) All risks of mortality (2) FMD / SWF / AI (1) 100% of market value (2) % of market value if slaughtered	As above for all farm animals	Yes excluded unless purchased separately
USA-Marysville Mutual Insurance Co.	Lightning/Wind/Hail/Drowning/etc	NA	
USA-Little Black Mutual Insurance Co	Wind, Hail, Fire, Theft, etc.	Our company does not offer disease coverage	Our policy only covers specific perils listed, thus, if the dieases is not listed as a covered peril, the disease itself is not covered.
USA- Farmers' Mutual Insurance Company	Named perils Fire:, Extended Coverage, Vandalism, Malicious Mischief &, Theft and Option Animal Perils (Accidental shooting, Drowning, Attack by Dogs or Wild Animals and Collapse of a Building) are widely available. Animal Mortality policies are less available. There may only be 10 - 15 domestic (USA) companies in the USA that I have heard of writing such.	None known	Not Known
USA-Hastings Mutual Insurance Company	Named Perils: Fire, Wind, etc. Accidental Shooting, Drowning, Attack by Wild Animals, Electrocution	None…No Covered Name Peril.	No…Again, only covered Named Perils apply
Ukraine- Etalon Insurance Company	Infectious disease (excluding brucellosis, leucosis, tuberculosis, foot-and-mouth disease, Marek disease, New Castle, avian flue). Fire. Natural risks (lightning, earthquake, mudslide, landslide, storm, hurricane, heavy rain, hail, heavy snow, etc.	From all but for exclusions. The livestock is not insured in quarantine regions	No

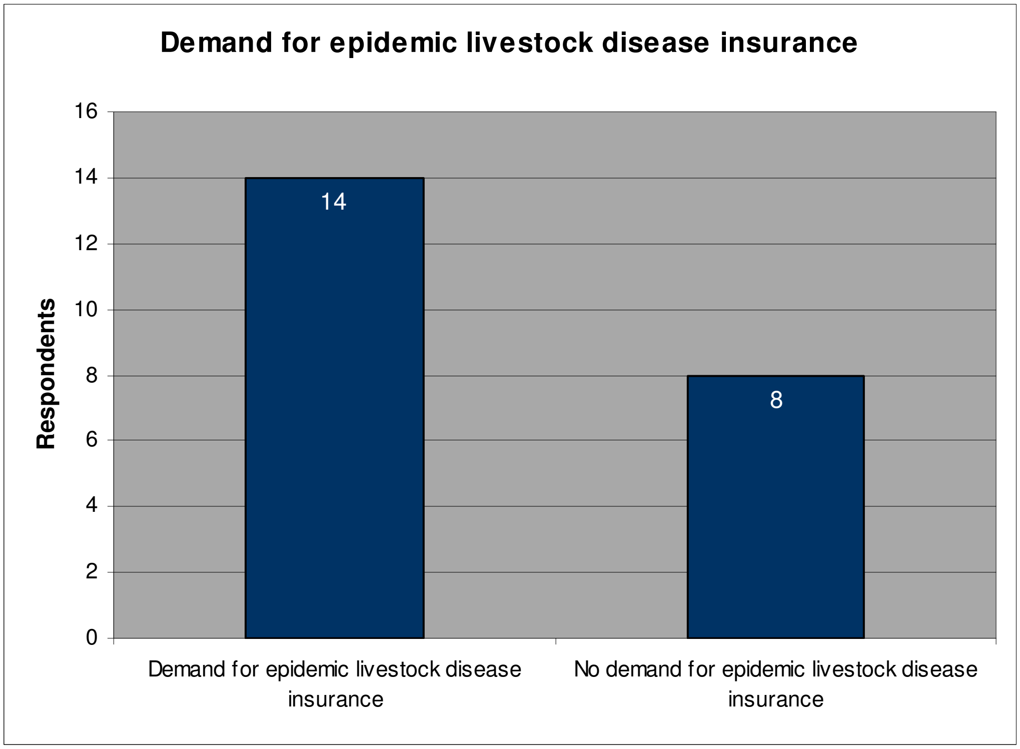
	Accident - blast, electric power stroke, drowning, death by transportation, suffocation, impact by wildlife or stray dogs, poisoning by plants or any substances, bite by snakes or insects, animal falling in canyons, etc.; Unlawful actions by third parties including stealing (breaking in through mechanical breakage of windows, doors and/or locks, robbery, damage by purpose		
Ukraine-TAS Insurance Company	Death of animal, stealing or problems with livestock's health due to : a) infectious disease, except brucellosis, leucosis, tuberculosis. Foot-and-Mouth disease is insured; b) fire, natural calamities, lightning, heat or sunstroke, freezing, earthquake, mudslide, landslide, hurricane, storm, heavy rain, hail, strong snow; c) accident, blast, impact of electrical power, drowning, death by transportation, suffocation, impact by wildlife or stray dogs, poisoning by plants or any substances, bite by snakes or insects, forced slaughter as instructed by veterinarian authorities, etc.; d) unlawful actions by third parties including stealing, robbery, damage by purpose	For all infectious diseases excluding brucellosis, leucosis, tuberculosis and avian flue	On all types of livestock brucellosis, leucosis, tuberculosis are excluded from coverage, avian flue is excluding for poultry
USA-Oklahoma Farmers Union Mutual Insurance Co	Named perils: fire & lightning, windstorm or hail, explosion, riot or civil commotion, aircraft, vehicles, sudden and accidental damage from smoke, vandalism, theft, sinkhole collapse, volcanic action, earthquake loss to livestock, flood loss to livestock, collision, electrocution of livestock, loading and unloading accident. Can endorse on the additional perils of freezing or smothering in snowstorms or ice storms and falling through ice, accidental shooting, drowning, attack by dogs or wild animals, collapse of a building.	None	Not defined, but it is a named peril policy and since they are not listed as a covered peril, they are excluded from coverage.
USA- Cooperative Insurance Companies			
Russia-First Insurance Company LTD	Diseases including infectious, contagious disease, invasive diseases. Diseases - non-infectious, non-contagious, non-invasive	All types of animals	Sick livestock Livestock that had positive reaction on brucellosis, leucosis, tuberculosis and other epidemiological diseases at the last check Livestock in the quarantine zone

			except for the animals resistant to such a disease
Israel- IFNRA Insurance Fund for Natural Risk in Agriculture	Death of animals, theft, veterinarian quarantine	All the diseases are covered for cattle, turkey and poultry, fish in ponds	Only if the government authorities decide to kill the animals (we don't cover damages through our insurance company) it is paid out by the government.
USA-COUNTRY Insurance and Financial Services Group	On our Farm policy, covered broad form perils are provided (which includes theft, drowning by flood, accidental shooting, attack by dogs or wild animals and electrocution by artificially generated currents).	On our Livestock Mortality policy, all disease that causes death to cattle, horses, swine, sheep, goats and dogs insured on the policy would be considered covered risk.	No
Chile-Asociacion de Aseguradores de Chile			
US-Nationwide Agribusiness	Broad Form Perils	None	No
SE-Agria Djurförsäkring AB	Life insurance Milk production loss Veterinary charges	All diseases, except for some epizootic diseases.	The epizootic diseases covered by the insurance are specified in the insurance policy.

Question 2: Is insurance cover for epidemic diseases available on the market in your country?



Question 3: Is there demand for epidemic livestock disease insurance that is not satisfied at present?

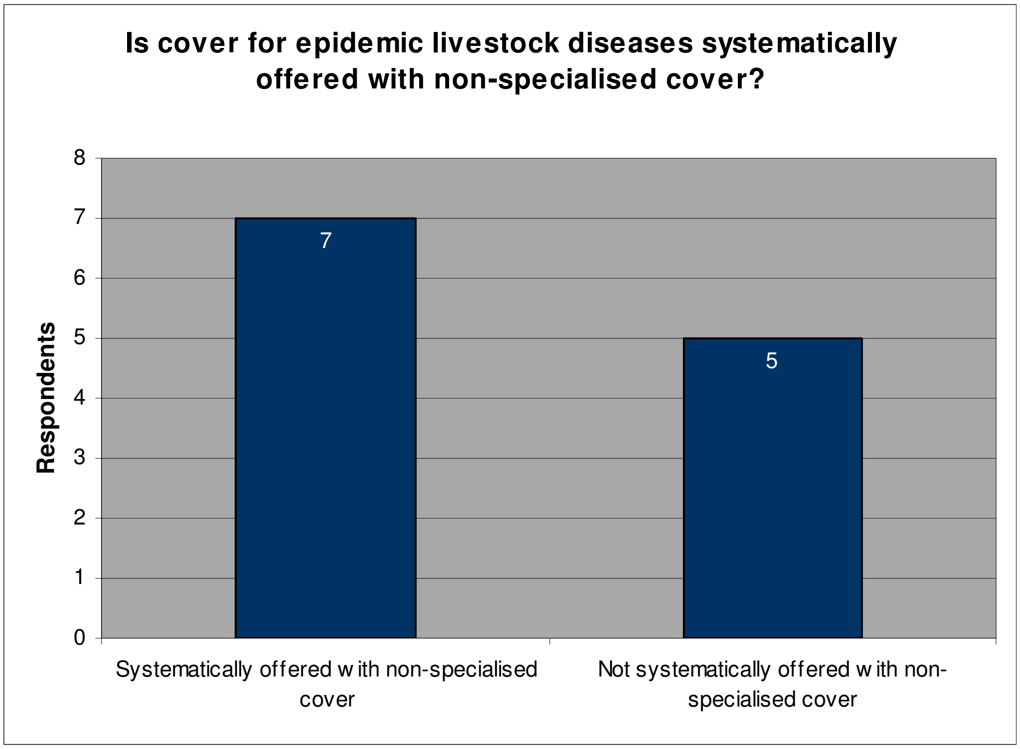


Diseases explicitly listed as a demand product were AI (8 respondents), FMD (3 respondents), Brucellosis (2 respondents), BSE (2 respondents), and several other respondents either specified listed leucosis, tuberculosis, Aujeszky's Disease, as well as several respondents listing that cattle diseases in general are in demand or all types of diseases are in demand.

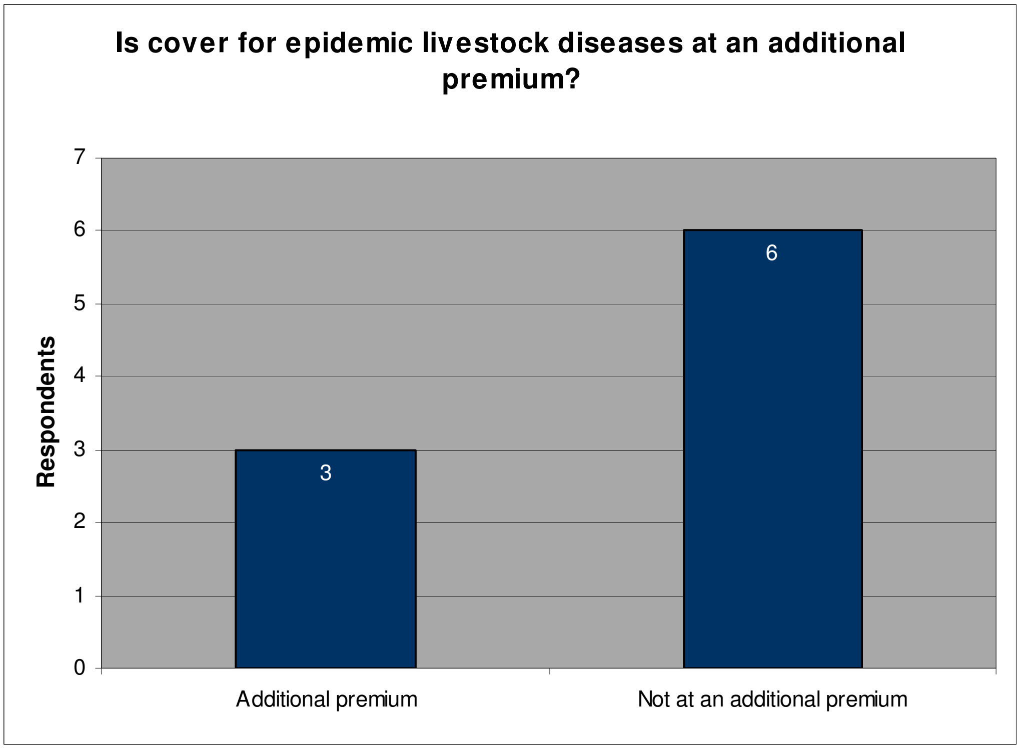
II) INSURANCE PRODUCTS CURRENTLY AVAILABLE

Question 6: Type of covers for epidemic livestock diseases

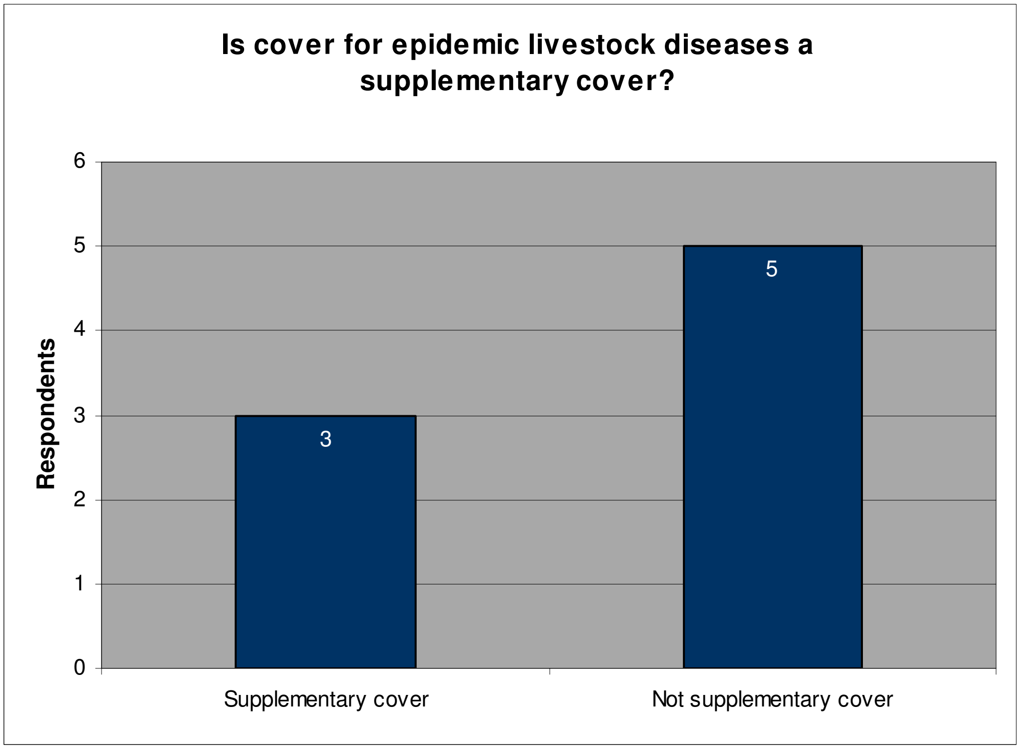
a) Systematically offered with non-specialised cover?



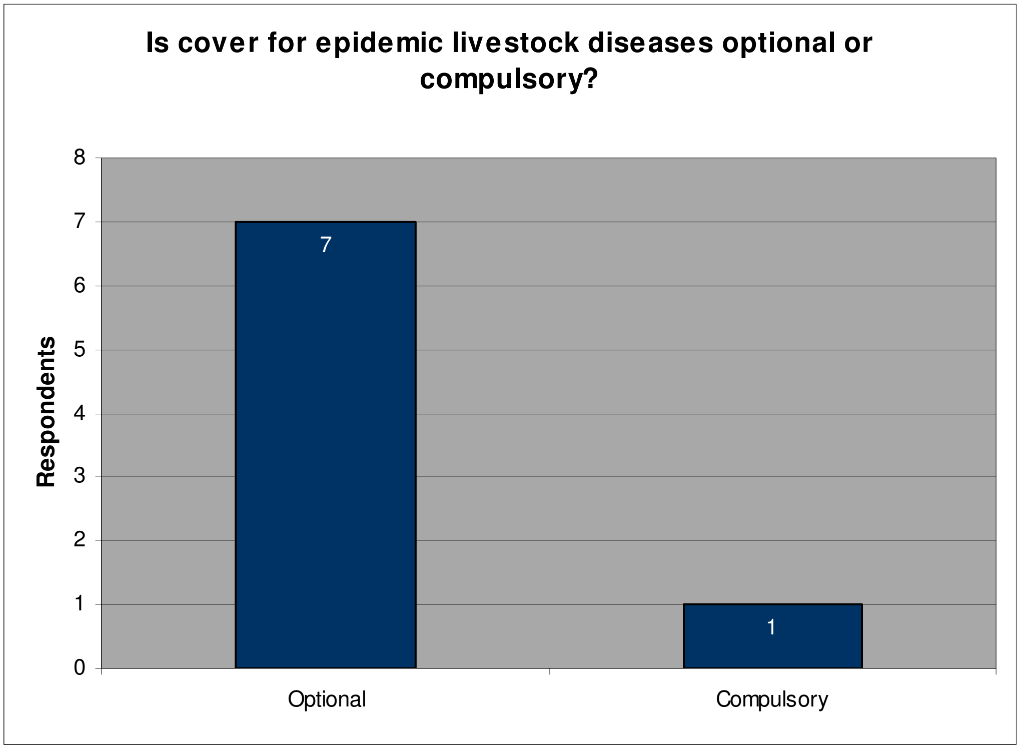
b) At an additional premium?



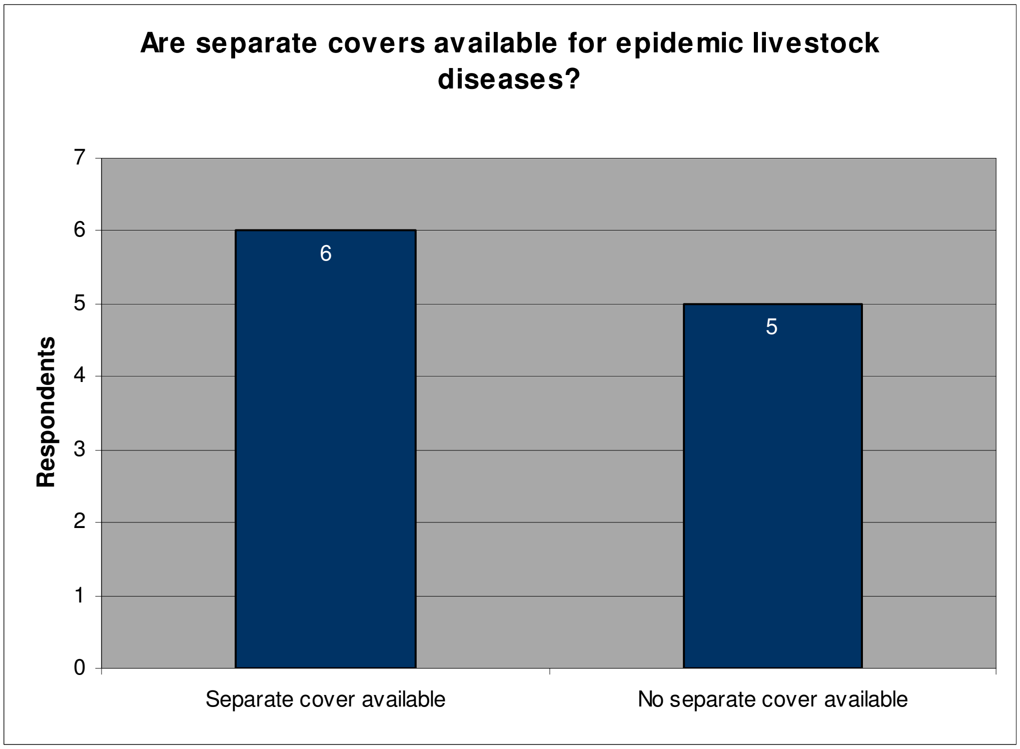
c) Or is it a supplementary cover?



d) In the case that it is a supplementary cover, is it optional or compulsory?



Question 7: Are separate covers available for epidemic livestock diseases (i.e., stand alone insurance products)?



Question 13: What is the subject of the cover?

Country	What direct losses are included in the cover?	What is the basis for indemnification of direct losses?	What consequential losses are included in the cover?	What is the basis for indemnification of consequential losses?	What losses cannot be indemnified?
DE-Munich Re					Losses caused by excluded risk Losses smaller than franchise
CH-Swiss Hail Insurance					
GR-Association of Insurance Companies	Value of livestock	Value per animal X No of dead animals minus deductible.	None		Lost of Profit and State compensations.
NL- Verbond Van Verzekeraars					Loss of export market, loss of market share, loss of breeder herd. Such covers would also require longer indemnity periods.
ES-MAPFRE	Please refer to question 4.	Both. Difference between standard state compensation and additional investment to improve livestock characteristics.	Stipulated production value * number of animals * months of paralization (limited to 4 months milk, 6 months fattening livestock and 1 month breeding livestock)	Please refer to previous question.	The loss of profit is limited to what has been listed in c- -loss in export market -loss of breed or herd (can take years to build up that herd)
CH- Partner RE	This is left to the compensation fund	According to the agreed terms of those funds usually market value of carcass before the loss	All of abovementioned	Ideally agreed values on above items, sometimes market value before the loss. Always on time units/ day or per week interruption. LOP max indemnity period often 6 months.	
20-CH-PartnerRE-interview.doc					
Korea-Komill	Cattle - death due to	Value of livestock	Pigs - Business Interruption	Expected profit rate	

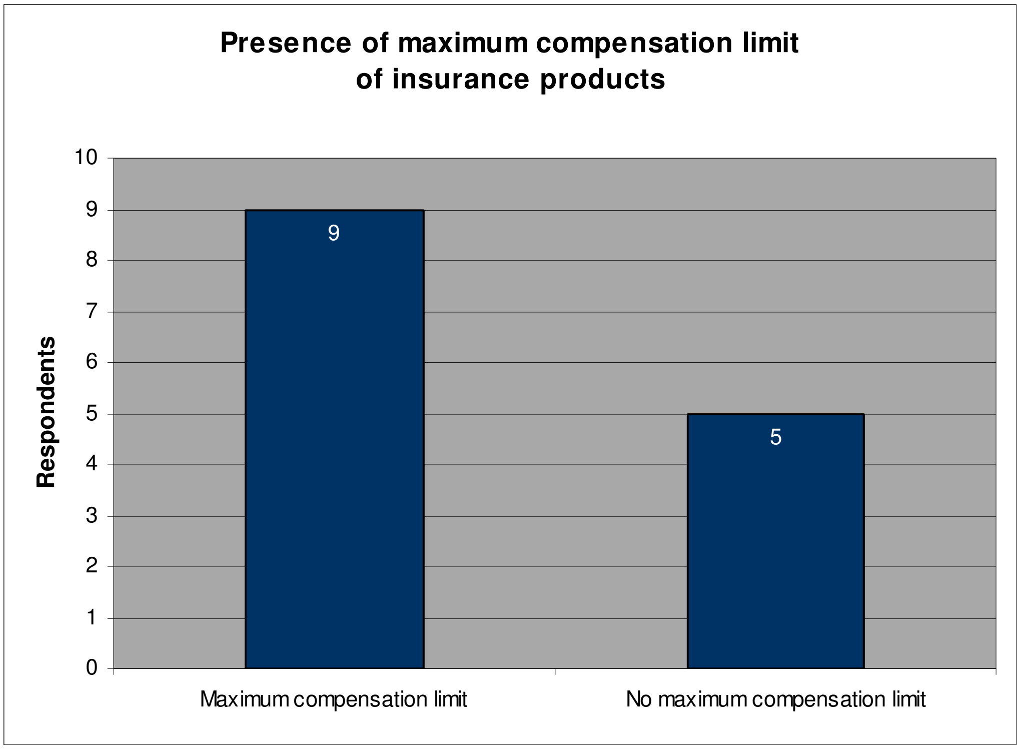
Broker Service Co., Ltd.	disease, emergency slaughter except legal Epidemic, Emergency slaughter, Sterility in case of cattle sire Pigs - death due to fire, and natural disaster(extended coverage for TGE, PED, Rota virus) Poultry - death due to fire and natural disaster Horse - death due to disease except legal epidemic, Emergency slaughter, Sterility		covered by extended coverage (optional)	considering the value and management cost (max 12% of livestock value)	
Uganda-Lion Assurance-rev-after Interview.doc					Please specify: Currently, business interruption (too expensive), clean up costs or general movement restrictions.
Uganda-Lion Assurance					
GB-Heath Lambert Group	Please specify: A percentage "Top Up" payment is made calculated on the value of the herd/flock.	Please specify: Indemnification is based on a percentage of the Government Compensation and any settlement shall not exceed the insured, scheduled value stated under the policy.	Please specify: Simply a percentage based on the value of the animal. There is no ensuing Loss of Revenue &/or clean up costs are excluded.	Please specify: The indemnity is calculated as a percentage of the insured sum or herd/flock value Average Clause would apply for over-valuation.	
FR -Groupama SA, Chinese branch	Value of livestock and rendering cost		See left.	See left	See 2a above
Thailand-General Insurance Association					
USA-Hartford	See 2a above	See 2a above	See 2a above	See 2a above	

Financial Services Group					
USA-McMillan Warner Mutual Insurance Company					Unknown
USA-National Farmers Union Property and Casualty Insurance Company					Business interruption at this time.
USA-Rural Mutual Insurance Company	Unknown	Unknown	Unknown	Unknown	
UK-Crowe Livestock Underwriting Limited	Value of livestock	% Of market value at time of loss	None.	Market value - % of.	
USA-Marysville Mutual Insurance Co.					NK
USA-Little Black Mutual Insurance Co					
USA- Farmers' Mutual Insurance Company	NK	NK	NK	NK	Vaccination - subsidized by the government
USA-Hastings Mutual Insurance Company					The insurance company does not cover costs for vaccination and other actions to immunize livestock that should be done on order of veterinarian authorities or are planned.
Ukraine- Etalon Insurance Company	Cost of animals, slaughter and rendering costs	Cost of animals, quantity of animals affected	Cost of veterinarian services, medicines, sanitary measures.		

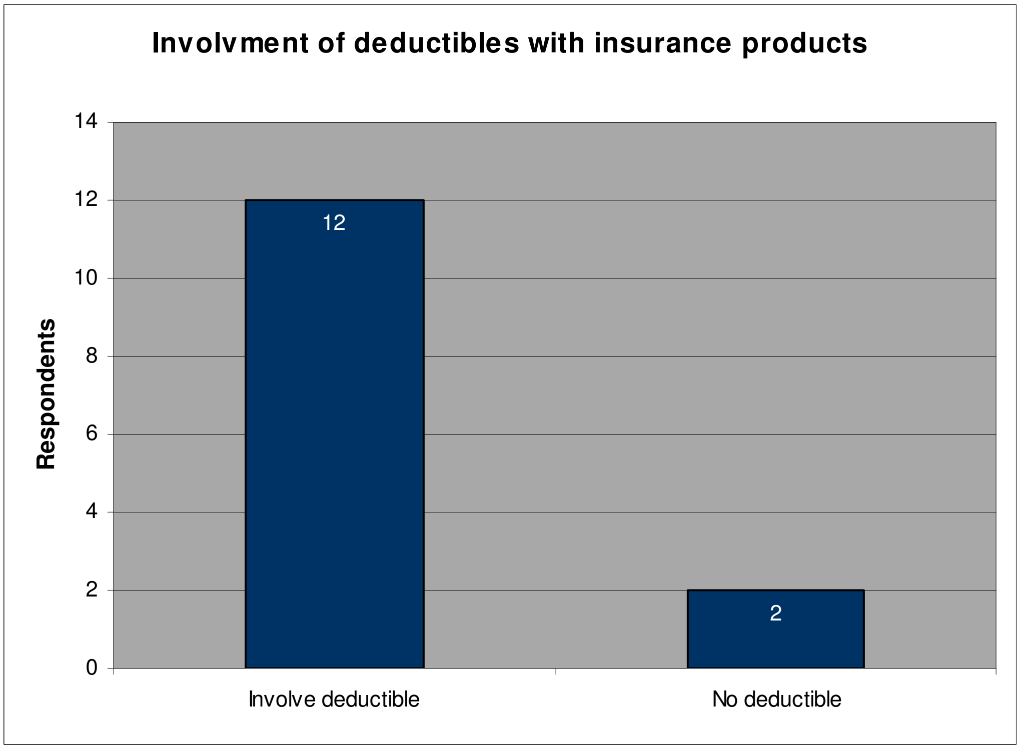
	Pedigree cattle is insured at purchase value. Cattle - cost of products at the open market (4 UAh per kg of live weight), chicken - 7 UAH, poultry - market value.				
Ukraine-TAS Insurance Company	Cost of animal, cost of medical treatment, forced slaughter, rendering costs limited at 25% from the insurance sum	The basis for indemnification is the cost of one animal, quantity of animals lost/damaged, prescription by veterinarian, receipts confirming purchase of medicines	Reduction of expected income	Claim application from the insured client and all documents that confirm loss of income, documents confirming the order to slaughter the livestock, record of animal check, dismemberment of corpses, certificate that meat was allowed for sale, certificate from government bodies that the farm did not get the planned income, etc.	
USA-Oklahoma Farmers Union Mutual Insurance Co					Losses indicated in para 12
USA-Cooperative Insurance Companies					Negligence, poisoning, war etc.
Russia-First Insurance Company LTD	Value of slaughtered or utilized animals	The basis for claim is the confirmed risk events with the supporting documents provided by the insured. The payout is done based on the Insurance act (report) within the established time period	Cost of veterinarian services and medicines. Reduction of livestock value due to loss of pedigree quality	Real loss or coverage in %	
Israel- IFNRA Insurance Fund for Natural Risk	Cattle- cost of evacuation for dead animals and the value of	Poultry-maximum value and age of livestock and number of infected	Interruption of production in the event of quarantine-poultry and expenses of	Dependant on the time until rehabilitation and sanitation by direct expenses	

in Agriculture	the animal. Poultry the value of the animal	livestock. Cattle per cow per age group	sanitizing the area.		
USA-COUNTRY Insurance and Financial Services Group	The value of the livestock, up to our policy limit, is the direct covered loss.	The basis for the indemnification of the direct losses is the value of the livestock, again up to our policy limit, and settled at actual cash value.	Additional coverage via policy endorsements, such as interruption of business production, loss of income, loss of value for high valued livestock, suffocation and suffocation coverage for non-owned livestock, etc. can be added to an existing Farm policy, for an additional premium.	The basis for the indemnification for consequential losses is defined in each of the endorsements that can be added to a Farm policy for an additional premium.	
Chile-Asociacion de Aseguradores de Chile					Only costs related to livestock production are covered.
US-Nationwide Agribusiness					Losses caused by excluded risk Losses smaller than franchise
SE-Agria Djurförsäkring AB	Value of livestock	Value of livestock x number of affected livestock that qualify for insurance cover	Interruption of production (production losses), decontamination	Actual losses	

Question 14: Do the insurance products available have a maximum compensation limit (ceiling of coverage)?

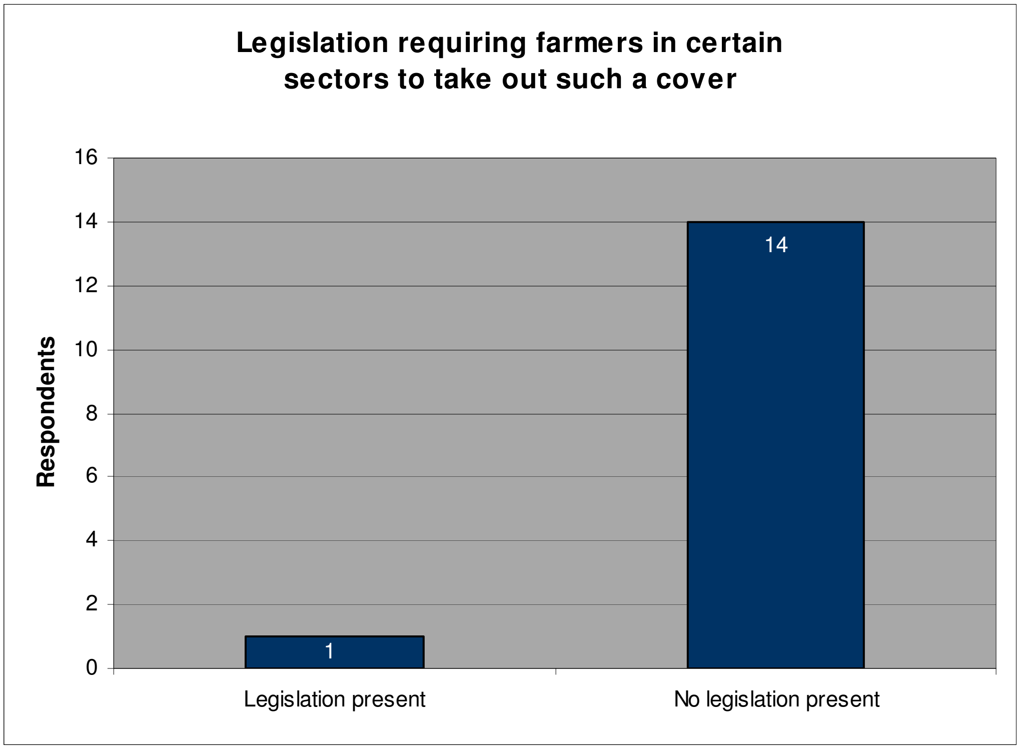


Question 15: Do the insurance products available include a deductible?



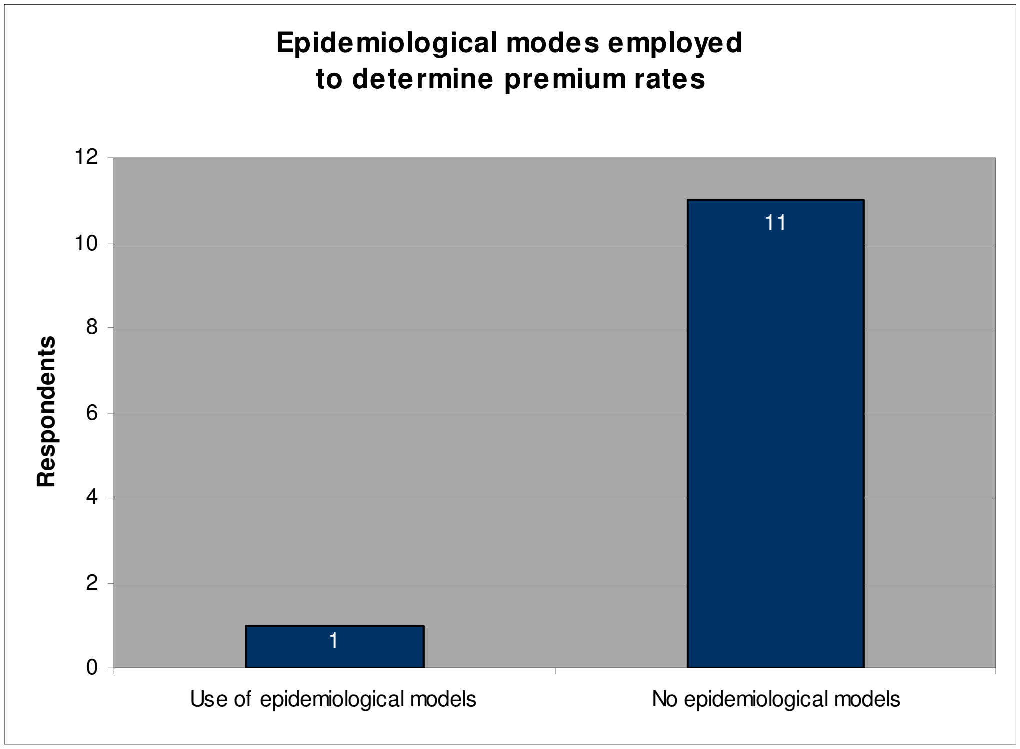
Two insurers offer insurance products without a deductible, in the United States and Great Britain. Otherwise, it seems more common to include a deductible for livestock insurance coverage.

Question 19: Is there legislation requiring farmers in certain sectors to take out such cover?



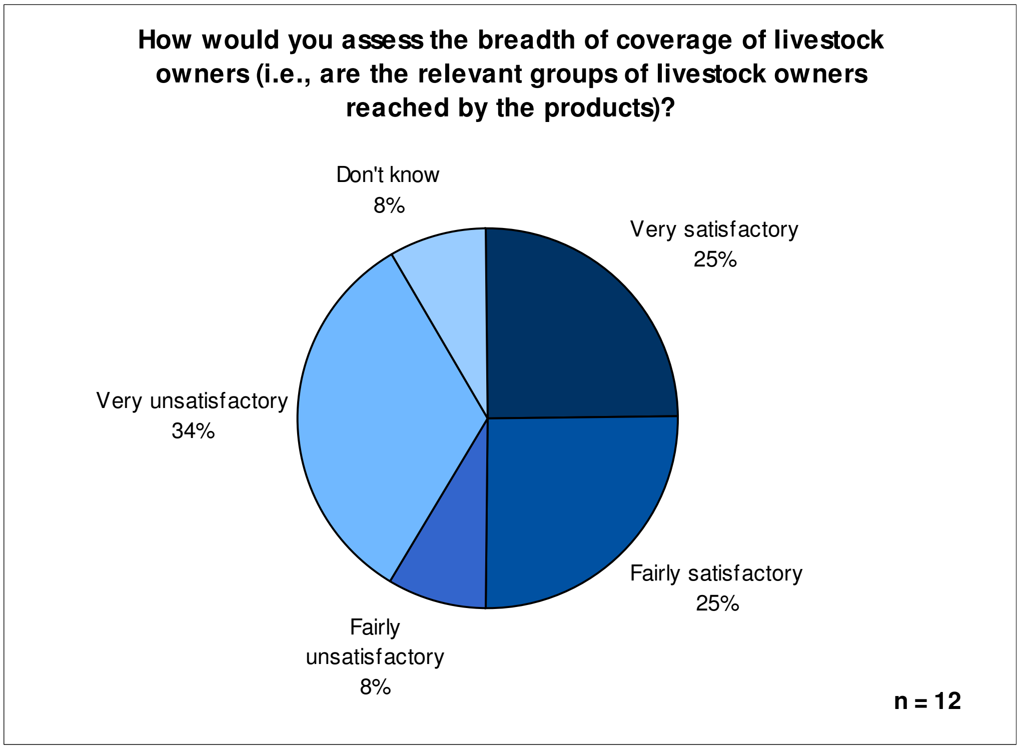
The one respondent to indicate that legislation was present for farmers to take out a cover was in the Ukraine, though the other insurer from Ukraine did not indicate the same thing.

Question 20: Are epidemiological models employed to determine premium rates?

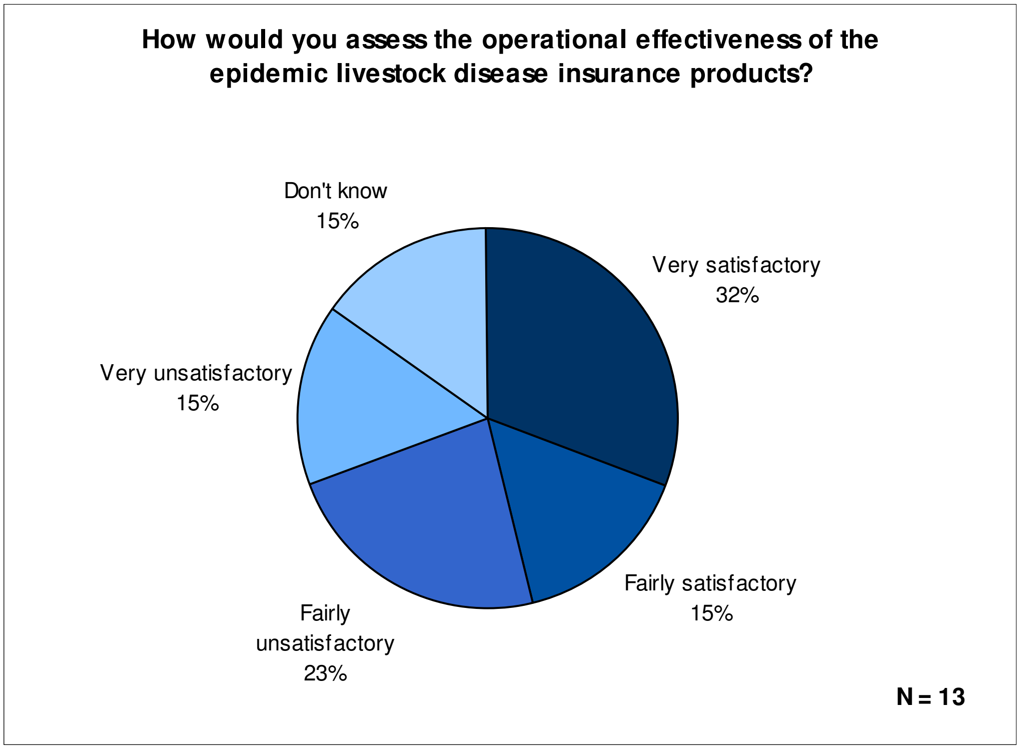


III) STRENGTHS AND WEAKNESSES OF EXISTING EPIDEMIC LIVESTOCK DISEASE INSURANCE PRODUCTS

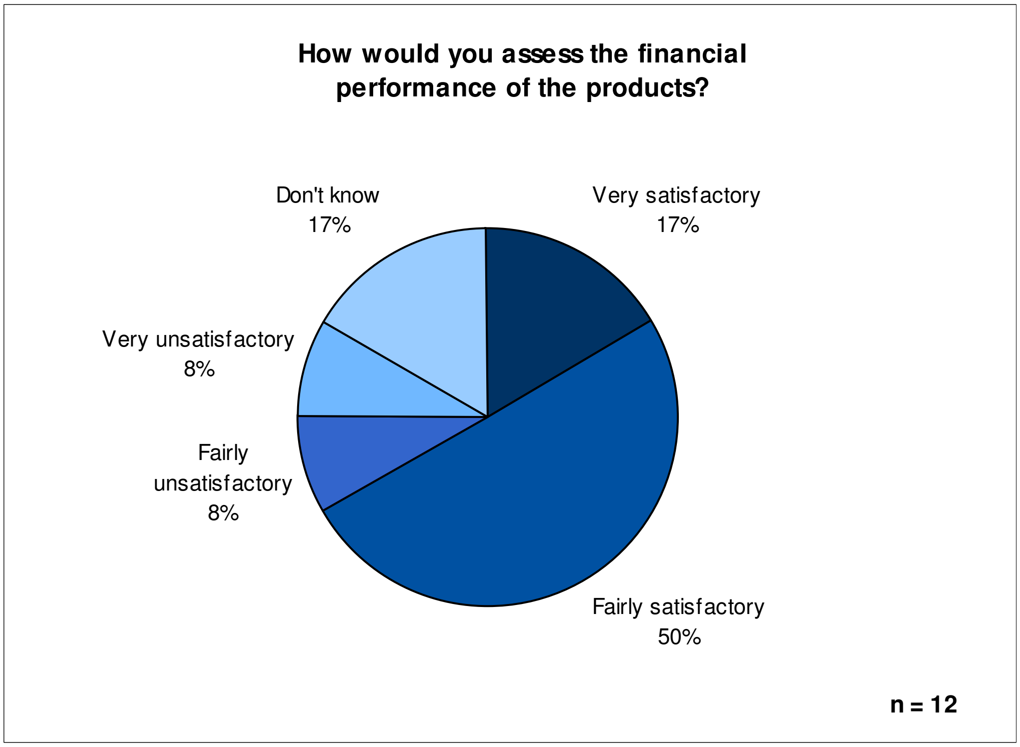
Question 22: Satisfaction of breadth of coverage of epidemic livestock disease insurance products



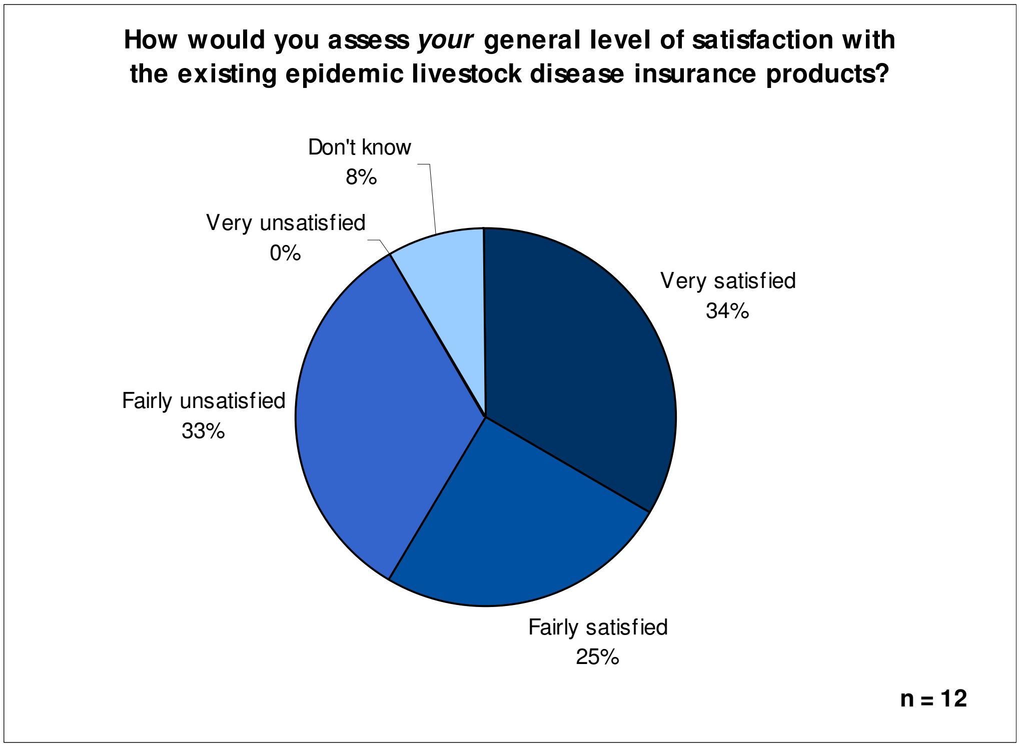
Question 23:Operational effectives of epidemic livestock disease insurance products



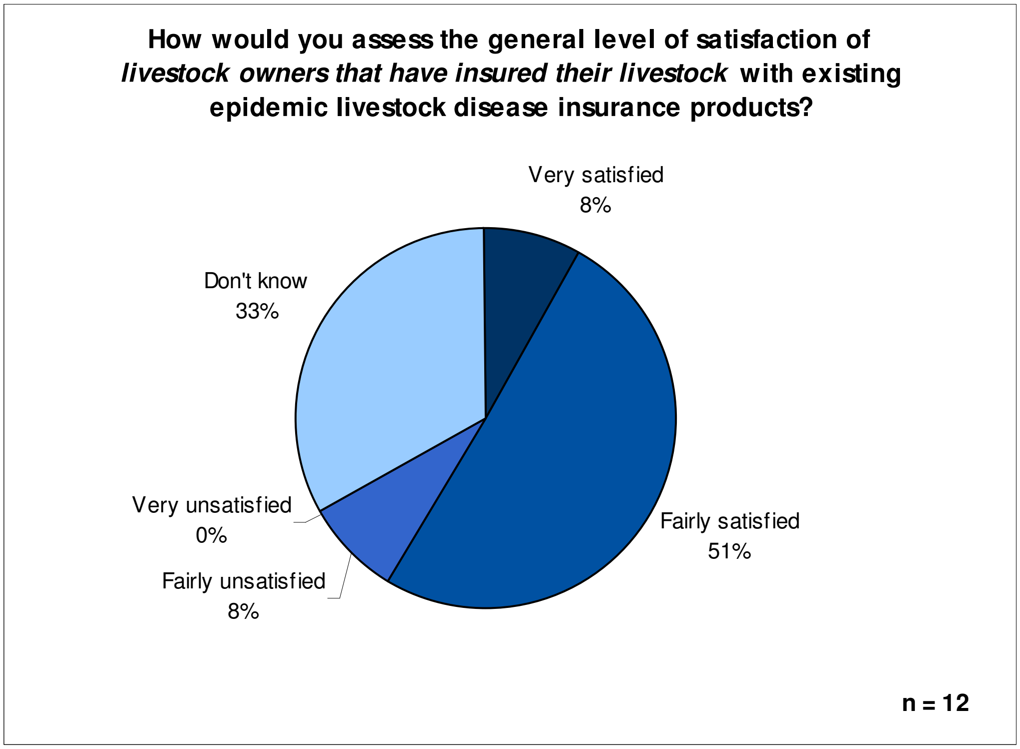
Question 24:Financial performance of epidemic livestock disease insurance products



Question 25:Insurer's level of satisfaction with epidemic livestock disease insurance products

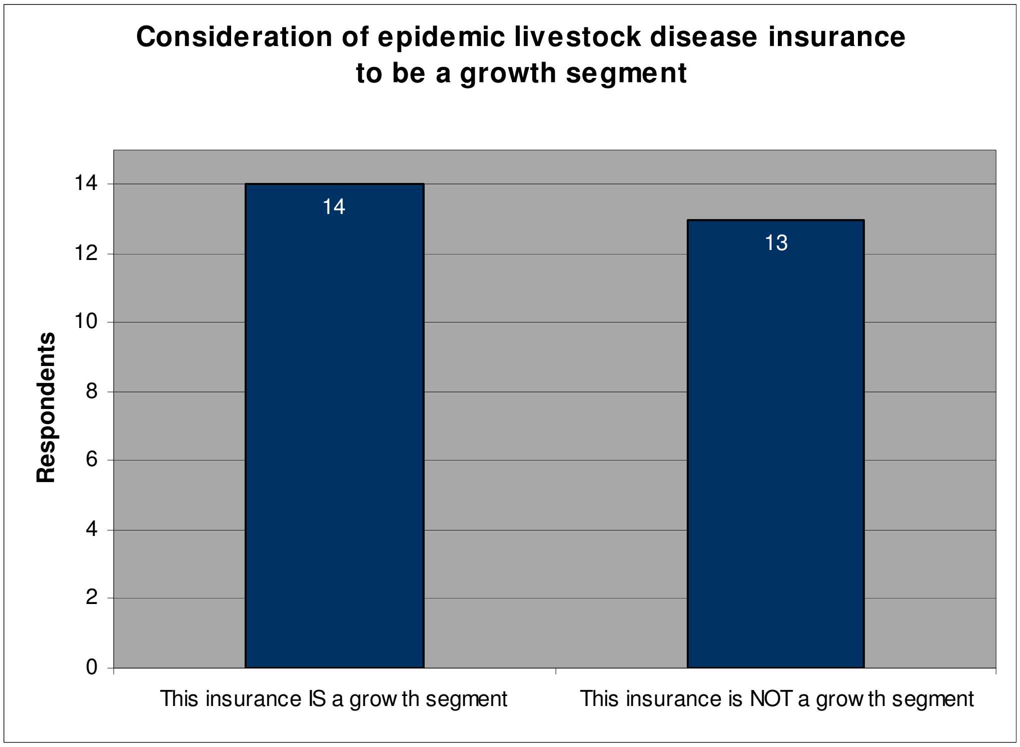


Question 26:Livestock owner's level of satisfaction of epidemic livestock disease insurance products



IV) PROSPECTS FOR EPIDEMIC LIVESTOCK DISEASE INSURANCE

Question 27:Do you consider epidemic livestock disease insurance to be a growth segment in terms of future development for insurance companies?



Questions 27-29: Prospects for development of epidemic livestock disease insurance

Country	Potential for development of these products? Yes/No	Why?	What are the main barriers for the development of these products?	What public measures/role of government could encourage the development of this market segment?	What should be the focus of a global programme of support for the development of epidemic livestock disease insurance products?
DE-Munich Re		There is not growth segment if there are not outbreaks...in Germany within 2 years if there is no outbreak, farmers will not renew their insurance agreement. It is possible to develop insurance companies, but the government would have to be involved in subsidizing farmer premiums. What absolutely must happen first is for the government to stop ad-hoc payments in order to establish long-term insurance products. The farmers have to be aware of the risks and they have to know that they have to take care of their own risks and that the government will stop paying for them. To get the government involved: It must subsidize the premiums (if the risk is adequate) and, if there are no other opportunities, be involved in some kind of reinsurance.			This is potentially quite problematic. There will always be countries with a lower and a higher exposure. In a global system, the countries with lower exposure will not want to support the ones with higher exposure, which tend to be poor and highly competitive. Even if such a programme were to function more as a global facilitator, who will handle the risk? How will the money be distributed in the case of a loss? Throughout the world there is very little infrastructure set up for risk control, risk handling, or methods to distribute finances. Livestock insurance is also not very well diversified in the world. Another problem with developing these products is that farmers are not being asked what they are prepared to pay for or if they have an interest. No farmer is willing to pay 5-10 dollars per head to insurance in countries that are not afflicted with diseases. Also it is hard to keep premiums for such products cheap without many farmers involved in an

					insurance scheme to keep the costs down. It is hard to get that kind of momentum (high numbers of participating farmers). If governments could be allowed to vaccinate, most governments would take this option because no economy in the world can afford these losses. At a global level, they need first to develop preventive veterinary measures and train the farmers with adequate husbandry techniques. Their records do not show that disease is spreading more or any faster now than before.
CH-Swiss Hail Insurance	No	Existing state-aided solution	Statutory compensation scheme	(At the National level) New legal basis without statutory compensation scheme	
GR-Association of Insurance Companies	Yes and No	On the condition that the extent of state intervention will allow market development and there will be available satisfactory reinsurance Farmers ask today for such insurance products because they believe that the state compensation is not always satisfactory	State ad hoc compensation, lack of satisfactory reinsurance, high premium rates unbearable by farmers	(At the European Level) European Reinsurance scheme, premium subsidies (At the National Level) Premium subsidy, less state intervention, state reinsurance cover	
NL- Verbond Van Verzekeraars	No	It will never be a profitable product	The government is responsible for the (health) safety of the population. That is why they always want to have influence in how to suppress an	(At the European and National Levels) Influence in the measures that have to be taken when an epidemic disease occurs. Give cover when the loss will exceed a	Acceptance of vaccination and introduction of vaccination programmes should be developed. Epidemic livestock diseases are on a private basis uninsurable! Insurance programmes can only be developed with a very strong

			outbreak. On the other hand, farmers underestimate the risk of epidemic diseases and are not really willing to pay premium. The conviction is that the government will always give financial support.	certain amount. Make preventive actions possible e.g marker vaccines.	(financial) support of governments. Compulsory funds, rules by the government are a much better solution then insurance (and cost less!).
ES-MAPFRE	Yes	To comply with livestock owners concerns.	Lack of common and homogeneous sanitary control guarantees at all levels: owners, country and international.	- Diseases sanitary control. - Design of common products to be sold by the market. - Subsidized premiums. In response to: "What measures at the national level could encourage the development of this market segment"	
CH- Partner RE	Yes	If there would be a clear political will that farmers have to look after themselves with the risk management tools available. Affordability could be enhanced with premium subsidy	Affordability, clear political message, acceptance from farmers that each program has a limit.		
20-CH-PartnerRE-interview.doc	Yes		Some of the volatile demand is based on behaviour of politicians not wanting to tell farmers they are responsible for their own losses. Some farmers know that government will bail them out -as long as there is this perception that	Raising awareness 2) when there is a miss match between the cost and the price farmers want to pay -this is when premium subsidy can bridge that gap -problem with insurance is they cannot wait for everything to start because they don't have the capital	Trouble is: almost every market it unique, hard to think of general recommendations that could apply anywhere 1) developed world: step up bio-security, make statistics reliable, 2) western world: raising awareness of farmers and banks, helping to crunch numbers, premium subsidies.

			the government will help them, then why should they pay for policy -also not a good understanding of farmers of what the losses are -and it is a rare event, so they don't think they NEED this extra coverage in order to be successful -banks ask for any insurance policy, don't care about what kind--they don't insist that the farms are covered by epidemics -how to raise the education?!?!	-they need to spread their costs over time	
Korea-Komill Broker Service Co., Ltd.	Yes	In our market, there is no Mad-cow risk, and SARS, but there were cases of pig cholera and bird flu (AI) recently. Therefore the demand from farmers always exists.	No support in reinsurance market, and the high premium required	Government subsidy on the premium for the individual farmers, and reinsurance protection over the loss cap of insurance company	International Reinsurance Pool scheme would help individual insurance player to write livestock epidemic exposure
Uganda-Lion Assurance-rev-after Interview.doc			The main barrier is funding There is a need for governments and NGOs to provide the funding for two main elements: 1. First finance helping farmers set up minimum bio-security		A global program would best involve the Ministry and encourage them to contribute to the insurance costs and measures to involve as many farmers as possible in order to create a larger pool, thereby making it more insurable A reinsurance pool would be one of the best ways to set up such a

			measures as these measures will make it easier to insure them 2. Subsidise premiums once insurance products are set up		pool
GB-Heath Lambert Group		Existing compensation is over-generous. Demand is only really stimulated during an outbreak.	A Loss of Revenue based policy would be more suitable for producers but the cost would be prohibitive to most farmers without some premium contribution from the Government.	A funded scheme, or risk pool, would need to be formed which could be supplemented by insurance premiums to ensure that there are sufficient 'funds' to meet losses in the early days of such a programme. Furthermore, this central fund could be protected by reinsurance.	To begin with, in my opinion, it should focus on western countries like Europe, North America and then be expanded to the developing countries. For example, some Latin American Countries would not have the infrastructure, like a State Veterinary Service, to quickly eradicate or control a widespread disease outbreak. Lastly, to attract the interest of World Insurers, these 'carriers' prefer to see a proven track record and so would want to see the performance record of such a programme before they would consider increasing their risk to the more exposed territories.
FR -Groupama SA, Chinese branch	No	First, we consider that epidemic livestock is a disaster, a calamity and not a "simple claim". Then the answer above is negative, it is because the fallowing reasons are not respected: § To insure a risk compensation: this principle of homogenous risks minds a strong risks selection. Nevertheless the claim must not to be to the same time for all insured people: these calamity situation and the damages resulted will be so apply	See left.	a pool of insurance companies (like Agroseguros in Spain) or a public réinsurance system manages by the State itself(like in USA)	See left.

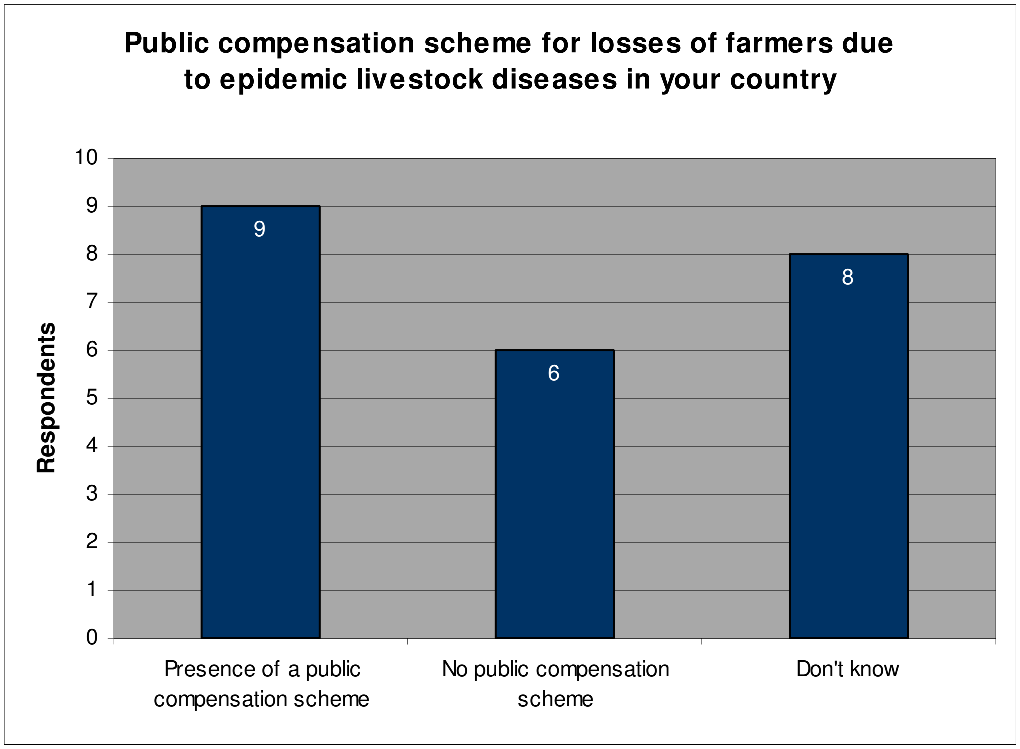
		to all the same population and it will not be able to be insured. § To have a well balanced result in case of claims, the risks must be irregular (randomised), the cash surplus from the "best years" make a capital fund			
Thailand-General Insurance Association	No	Most of the farmers in our country are not well trained to feed the livestock for business purpose and lack of risk management conscious.	The farmers cannot afford to the insurance premium.		
USA-Hartford Financial Services Group	No	Livestock producers remain concerned about effects of a disease outbreak	It will take a partnership of govt and private resources	Education of lawmakers as to the size of the exposure; to provide reinsurance	A fair, local market based compensation for destroyed livestock
USA-McMillan Warner Mutual Insurance Company	Yes	Yes due to the possibilities that an epidemic could happen	Lack of programs available, Reinsures willingness to participate	Knowledge of availability of such coverage, Reasonable Pricing,	Communication and information
USA-National Farmers Union Property and Casualty Insurance Company	Yes	Even though I am not familiar with the markets for this - I do not believe that the market is being fully served - and therefore - it would be an area for growth.	To me the main barrier would be the catastrophic nature of the loss potential and lack of reinsurers	I do not believe there is an appropriate role for government in this area. If the demand is great enough and companies believe they can get sufficient premiums - the market segment will develop.	From a global prospective - the availability of affordable reinsurance is would be the best approach.
USA-Rural Mutual Insurance Company	Yes	Too much risk involved			
UK-Crowe Livestock Underwriting Limited	No	Mainly AI	Price, level of cover and capacity	Nothing will improve until there is confidence in the government that they will handle another outbreak successfully and professionally	1) Min disease prevention procedures followed by all farmers 2) coordinated approach and clear protocol by the government 3) a proper compensation programme to encourage all affected farms to advise of a disease immediately.

USA-Marysville Mutual Insurance Co.	Yes	Too broad of coverage	Unknown loss exposure	Don't know	?
USA-Little Black Mutual Insurance Co		We don't want to cover a risk that would most likely result in catastrophic total loss.	Historical lost cost ratios do not exist, so, how would you rate it?	I feel this is solely a governmental issue, not a private sector issue.	Because of the potential quarantine of the livestock herd (and likely disposal of herd), any program should only cover risks that have taken preventive measures to limit such diseases.
USA- Farmers' Mutual Insurance Company		There is a market for it if the premium is affordable with adequate capacity/surplus to accept.	The unknown.	NK	NK
USA-Hastings Mutual Insurance Company	Yes	The US market does not have the capacity to underwrite the risk.	Lack of knowledge, desire and capacity.	The USDA picks up the limited exposure now.	From my perspective. I don’t see any great support.
Ukraine- Etalon Insurance Company	No	Livestock Insurance needs government support			
Ukraine-TAS Insurance Company	No	Livestock production just started to develop and the producers start to display interest in insurance of their livestock	The market demand is not clear to insurance companies. Lack of marketing research on agricultural insurance.	Introduction of mandatory insurance program	Exchange of experience with foreign companies. Design of new insurance programs based on market research.
USA-Oklahoma Farmers Union Mutual Insurance Co	Yes	When we have our first loss due to epidemic disease the farmers will be looking for a product, the bankers will be requiring coverage on their collateral and the government will be looking to the insurance industry to provide a product.	Not much demand for it today, before the outbreak, and no rating history or development, possible lack of reinsurance market.	You will have to have a loss for the farmers to even think about needing the coverage first. The government could provide a backstop or reinsurance like they have on terrorism.	Availability at an affordable price. Universal coverage that everyone has to participate in to spread the risk and cost of the program.
USA-Cooperative Insurance Companies	Yes	A general lack of risk awareness and cost	Acceptance by the marketplace of a real need for the product and cost.	Public education and information sharing	I am not able to envision the development of such a worldwide product.
Russia-First Insurance Company LTD	No	WTO entrance, entering foreign companies to Russian market Cheap labour resources. The fear to lose business	There are no problems in products design. Russia always had talented specialists	Writing off all debts No taxes for farms during the next 5 years Access to cheap finance	Founding a State insurance company on mandatory agricultural insurance using 50% subsidies for premiums from the

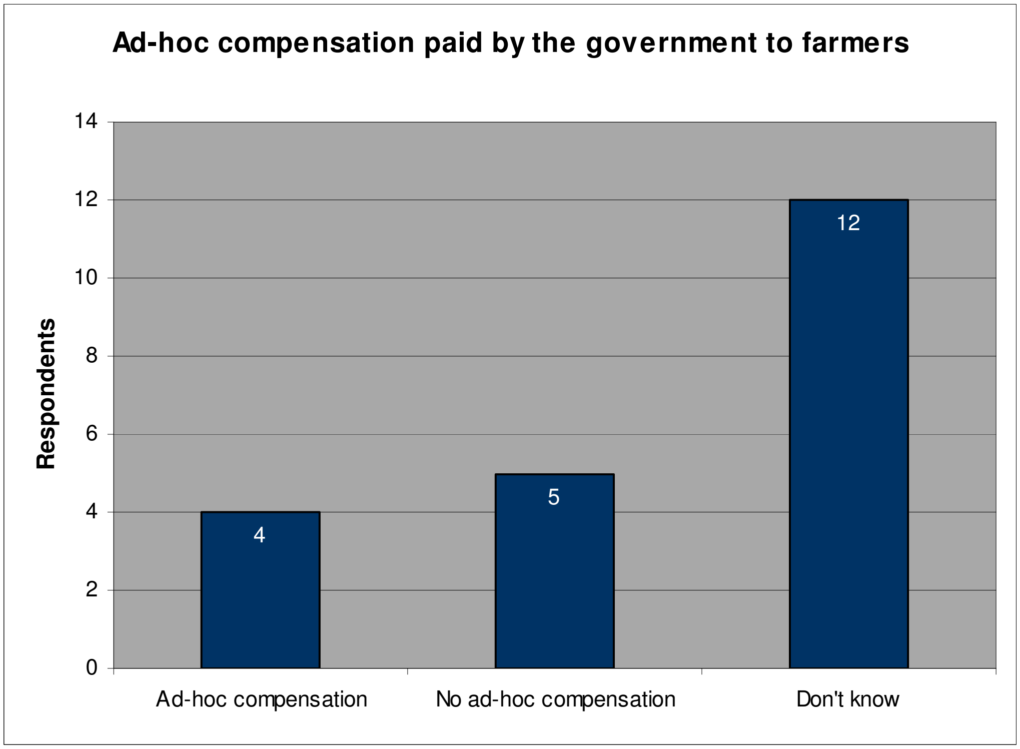
				It is a know fact that one working place in agricultural sector provides 10 working places in other industries Organization of the State insurance company n mandatory agricultural risks insurance using 50% subsidies for premiums from the federal budget, facilitating the agricultural insurance and reinsurance pools.	federal budget, facilitating the agricultural insurance and reinsurance pools.
Israel- IFNRA Insurance Fund for Natural Risk in Agriculture	Yes	All diseases and most of the farmers are covered so the place to grow is limited.			Global interaction and knowledge and informing all about epidemics and ways to fight them together
USA-COUNTRY Insurance and Financial Services Group	No	I do not feel that epidemic livestock disease insurance will be a growth segment in terms of future development for our market (Illinois) due to the steadily declining number of livestock. Livestock in our market is not the major agriculture commodity that it once was.	The main barrier would again be the decline in growth of livestock.	I feel that if a major disease epidemic should occur, the appropriate role of the government would be to provide financial (catastrophe) assistance.	Unknown
Chile-Asociacion de Aseguradores de Chile	No	El mercado potencial es muy pequeño (la agricultura en su conjunto representa el 5% del PIB), por lo cual el primaje requerido será muy alto.	No existe conciencia del seguro (nunca se ha asegurado el ganado vivo), no hay incentivos para asegurar y desarrollar programas tiene costos muy elevados.		
SE-Agria Djurförsäkring AB	No	The number of infectious diseases is increasing as a consequence of more cross-border mobility. This leads to	High risk and difficulties of finding re-insurance at a reasonable cost.	(At the European Level) Common epizootic legislation and increased control of livestock trade.	

		increasing need for insurance.	Health control programmes reduces the risk and thus lowers the barriers to develop new insurance products.	Restrictions on mobility of livestock, quarantine regulation and prevention of smuggling. (At the National Level) Increased control of livestock trade. Restrictions on mobility of livestock, quarantine regulation and prevention of smuggling. Campaigns to increase knowledge of infection. Control of imported livestock. Improved health control programmes.	

Question 30: Is there a public compensation scheme for losses of farmers due to epidemic livestock diseases in your country (without involvement of private insurers)?



Question 31: Was there ad-hoc compensation paid by the government to farmers (not related to a public compensation scheme) in case of epidemic livestock diseases in the period 2000-2005?



Insurers reported ad-hoc compensation by the government from the US, Great Britain, Greece and the Netherlands.